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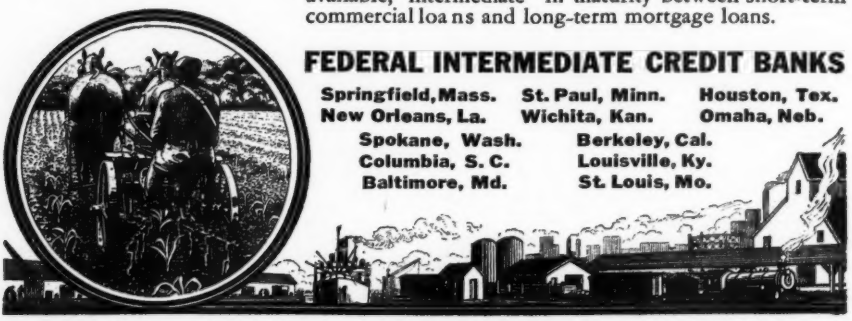

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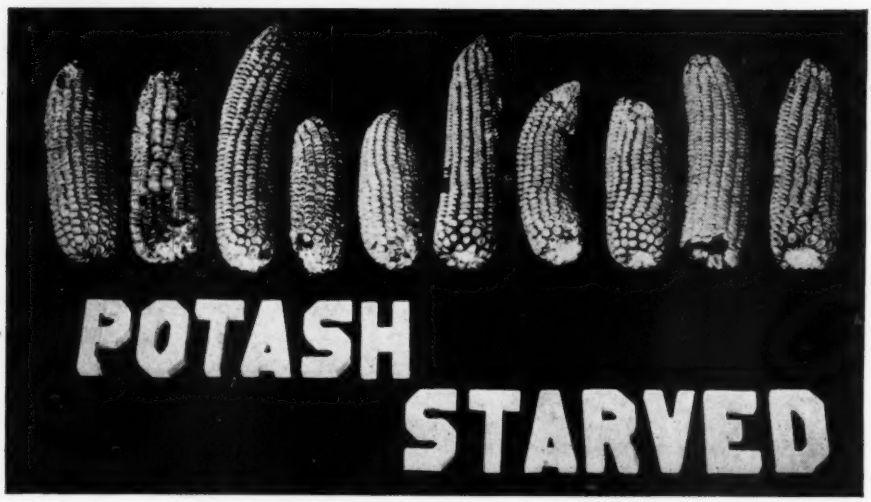


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# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

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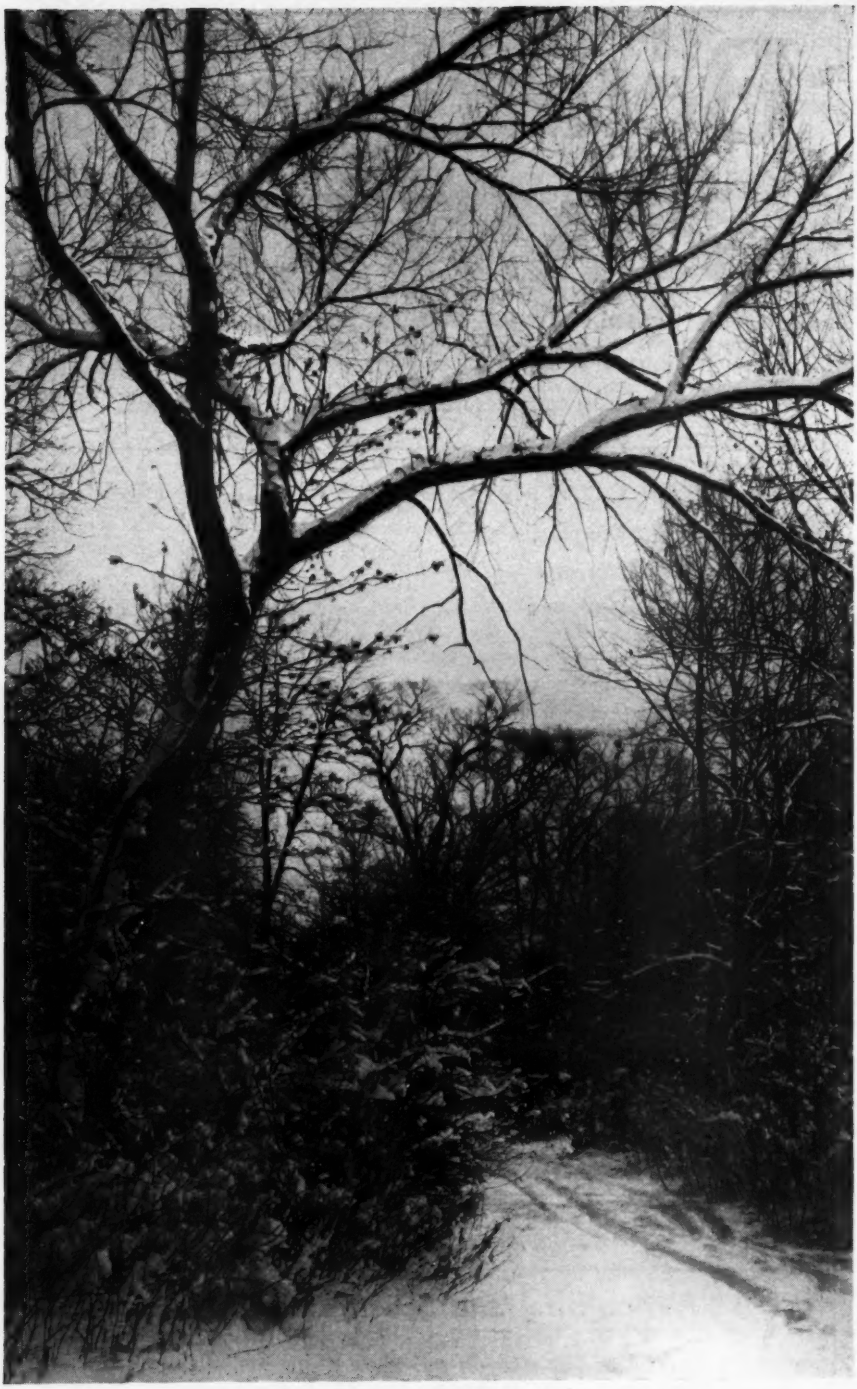

THE PEACE OF THE SNOW

Better Crops with PLANT FOOD

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*Patch up your judgment to match your honesty, and the future of America is assured.*

# Oh! Owe!

By Jeff McDermid

SOMEWHERE in the oriental philosophy of Confucius or Li Hung Chang, as they gave it to us in school days, was the statement that from time immemorial it was the custom of Chinamen to settle all their debts on each New Year's Day. So Father used to make what haste he could to pay his laundry bills in December so that our yellow neighbor with his pigtail and funny alphabet might live up to the tradition of his worthy ancestors.

I also recall that debts were discussed in the rural family circle with serious mien, and that the man who held the mortgage on our property was treated with honest deference. I likewise remember the lurid melodramas that came to the musty "opry house" entitled Uncle Josh Spruceby and the Old Homestead. How we gritted our teeth when the villain came in amid a swirling paper snow-storm to "serve them documents" on the heroic old granger.

But that was before the days of

high taxes, or else the aforesaid villain would have been too late to get anything worth seizing. To be a mortgage villain nowadays is a liability, and the sympathy of the audience might well turn to him rather than to the debtor. Your modern forecloser knows that the government obligation has first lien on the land, come what may, and that it is leaning so blamed heavily sometimes that the barn caves in. And furthermore, he has to rustle around and locate another tenant who will be willing to stake his time and labor against sagging farm prices on a chance of being in the same boat next year as the first occupant.

AS an aftermath of the holiday and strike movement which I tried to discuss last time, we find the nation turning its attention to refinancing the agricultural debt. Part of the political battle was won on the rural impression that if we can loan vast sums of cash to foreign countries and to railroads, we might as well start being generous on credit terms to the citizens who feed us. They elected members of congress on purpose to settle this very thing, and presently we shall see how well it turns out.

Just to get an eyeful of the obligations which have accumulated, I had to dip into a dusty document issued at Washington. In reading it I wonder how in time our folks around the oilcloth-covered kitchen table ever imagined we were hard up or faced a reckoning. We owed about $1,000, I suppose, and the book I have here says the total per capita national debt, both public and private, is around $1,700.

IN assuming this to be our legal debt as a cosmopolitan citizen we have to imagine ourselves to be composed of the following separate entities: we are corporations owing 37.4 per cent of the debt; city mortgage debtors with 18.2 per cent; borrowers at banks with 17.3 per cent; payers of local taxes at 10.3 per cent of it; supporters of federal government amounting to 8.9 per cent; farmers with land mortgages and chattels at 4.4 of the total; holders of life insurance policies liable to the extent of 1.5 per cent of all debts; and merchants with outstanding bills for 1.5 per cent of the debt; leaving one shady item wherein we are customers of pawnbrokers and gamblers for half of one per cent of the debt.

The whole sum reaches up into the clouds around 200 billion dollars. When it gets that high I cease to fret about it very much, whereas if it were 75 cents I might go around the block to avoid meeting the man I owed it to. I have reached the conclusion that this confounded interest and principal pyramid won't be paid, because at compound calculation there isn't enough money to do it with—when our national income is only 40 billions, so they say.

I WISH somebody could tell us exactly what the proportion is between creditors and debtors. It is probably true that there are equal balances between money debts and their counterpart in credits, but I surmise that there are many more individuals who owe obligations than there are individual creditors. If we proceeded on a majority vote with debts as we do with presidents and beer, the plan of a Scotch friend of mine would be overwhelmingly carried. He claims the nation would be better off to forget the debts and start all over again. But if every farmer might erase his mortgage, the fellows on the credit side would be so peeved about the deal that not a furrow would be turned or a bag of feed bought on credit. And so without a higher price level for farm goods, even a mortgage gift to a farmer would do little for his welfare. Farmers are not looking for gifts. They simply want opportunity.

(*Turn to page* 61)

**The splendid condition of these sweet potatoes, after one year in storage, attracted much attention at agricultural fairs this fall.**

# The Keep *of* Sweets

## *By George R. Cobb*

Salisbury, Maryland

IN an effort to meet the ever-increasing, all-year-round consumer demand for sweet potatoes, a large amount of experimental work is being conducted along the lines of storage houses, varieties, methods of culture, fertilizers, packing, and marketing, as they relate to quality, yields, and economic productions.

Until recent years the problem of storage has been the main reason for "gluts" in the market, as practically the whole crop, approximately 80 million bushels, has been marketed in a very short space of time. With better storage facilities, it is now possible to prolong the shipping season so that the consumer can purchase sweet potatoes at almost any time during the year.

There is a tendency among sweet potato growers to attribute poor keeping quality to high-potash fertilizers. No proof that this is true exists, and yet the belief persists in some of the sweet-potato growing areas.

The DelMarVa Peninsula, comprising the State of Delaware, nine counties of Maryland, and two counties of Virginia, constitutes one of the leading sweet-potato areas of the country. This particular section leads all others in production per acre, as yields, on the average, are about 50 bushels per acre more than in any other sweet-potato producing area.

With this fact in mind and also with the added knowledge that there are more sweet-potato storage houses on the Peninsula than in any other similar area, a series of tests was conducted by growers on the Peninsula. These tests were made with the cooperation of the County Agents, Extension Officials, storage-house managers, and growers.

Several different combinations of fertilizers were applied to the several plots under consideration; records of yields from each plot were made; condition and quality of tubers as dug were noted; and these tubers, or rather samples from each plot, were stored in commercial storage houses. The following spring an inspection was made of all potatoes placed in storage, and records made of the shrinkage, both as to rots and natural shrinkage.

It has been found that with the Little Stem Jersey, sometimes known as Up River, Jersey Chunk, etc., a shrinkage of 20 per cent is about average, this 20 per cent being divided equally between rots and natural shrinkage. But with varieties such as the Big Stem Jersey, the natural shrinkage usually averages larger than with the smaller varieties.

Sweet-potato storage houses are maintained at a temperature of 85 to 90 degrees F, for the first two or three weeks after the potatoes are housed in order to dry them out as they go through the "sweating" process. If this is not done, rots are prone to develop and spread very rapidly with resultant loss from shrinkage.

As soon as the sweating is over, the houses are maintained at 50 degrees F., or as near that temperature as possible, during the balance of the storage season. Steady temperatures are maintained by proper ventilation as well as by the control of the heat from some form of heater.

**Wm. M. Hatten and County Agent J. P. Brown, Salisbury, Maryland. Mr. Hatten's program for fertilizing sweet potatoes is 200 lbs. of sulphate of potash and 1,200 lbs. of 0-10-12. He averages from 350 to 500 bushels per acre. In 1931 on one field he averaged 634 bushels per acre.**

At harvest time it was not surprising to find that yields from the plots receiving a 4-4-20 commercial fertilizer were greater than from those receiving a 2-8-10 mixture. The 4-4-20 mixture at the rate of 1,000 pounds per acre increased the yield over the 2-8-10 applied at the rate of 2,000 pounds per acre, by 42 bushels, and at the same time produced potatoes of better size, color, and skin texture.

These results

**A field view of the yield of quality sweet potatoes on well-fertilized soil.**

are in line with those secured by the Experiment Station at Onley, Virginia, where increased potash in the fertilizer, ranging from 3 to 15 per cent, produced increased yields.

Experimental work at both the New Jersey Experiment Station and the Virginia Station agree that a high-potash content in the fertilizer mixture develops a better shaped potato than low potash and high nitrogen.

In another series of tests where a 3-8-8, 3-8-11, and 3-8-13 were compared, the resultant yields were 225.2 bushels, 228 bushels, and 276 bushels, respectively. As noted, when the potash content was increased from 8 to 13 per cent, the yield was increased from 225.2 to 276 bushels.

Viewing the results of these tests as a group, it is clear that where potash has been increased—the nitrogen and phosphorus remaining constant—consistent increases in yields have been secured. Of significance too, is the fact that similar results have been reported by experimental workers of the New Jersey, Delaware, Virginia, and Maryland Experiment Stations.

The potatoes from these plots were harvested in October and placed in storage the same day that they were harvested. The following spring an inspection was made by the Extension Pathologist. The tubers were examined individually, and rots, shrinkage, etc., noted and recorded. No consistent difference between the tubers from the several plots was found. In fact there was more difference between tubers from the several packages than in tubers from the different plots.

Among the "storage rots" are soft rot, surface rot, dry rot, Java black rot, and charcoal rot. Other rots may develop indirectly from the effects of these storage rots. The results of comparing the low and high-potash plots are given in the following table:

| Fertilizer | Soft Rot | Surface Rot | Scurf | Healthy | Total |
|---|---|---|---|---|---|
| 3-8-8 | 25 | 121 | 2 | 37 | 234 |
| 3-8-13 | 24 | 99 | 0 | 48 | 238 |

The above table, a record of the individual tubers in a "sample" package from each plot, illustrates the fact that the high-potash plots produced potatoes that kept as well as did the low-potash plots.

In 1931 Mr. Olin T. Elzey, Salisbury, Maryland, applied 800 pounds of 4-4-20 and 800 pounds of 2-8-10 per acre to the sweet-potato crop. These potatoes, or rather samples from the field, were placed in storage in October, 1931, and one year later they were "packed out." Incidentally, the

(*Turn to page 59*)

# Back *to the* Farm

*By Hugh Hammond Bennett*

United States Department of Agriculture, Washington, D. C.

AGRICULTURE was the basis of America's rapid economic development. While hunting, fishing, and trapping were incidental activities of the pioneer stage, the major purpose of practically every settlement was to clear the woodlands or to break the prairie sod as quickly as possible in order to plant more and more corn, tobacco, wheat, and, later, cotton. The raising of livestock became an important part of the forward-moving program after the advance lines of emigrants had attained the border of the trans-Mississippi grasslands. Lumbering and manufacturing came along in due time and grew steadily.

From a predominantly agricultural status the country eventually passed on to a manufacturing-agricultural status, with farming showing a relative tendency toward a background position in our national thought. The go-west-young-man movement largely subsided about two or three decades ago. It was replaced by a movement from farm to city. The sign-post at the cross-roads of that phase of population readjustment read, according to popular interpretation: "The city offers better opportunities for profitable work and enjoyable living."

### *A New Movement*

Now a new movement is setting in, this time from the city back to the country. This latest trend appears to be motivated not so much by better opportunity for profitable work as by better opportunity for first making a living and after that as much profit as may be derived from surplus crops.

Our national life has been characterized by such movements and readjustments from very early times. So has the history of mankind, although there have been and will continue to be numerous community, regional, and national exceptions. In some parts of rural America farmers have shown much the same love for the land of their natal localities as those families of France who have passed on their home places through generation after generation of the same family, over periods of more than 700 years. Pennsylvania "Dutch settlements" and others measurably like them have revealed a similar wholesome love for the land, a fact that makes the traveler wish to linger for better acquaintance with these localities of well-kept, thrifty farmsteads, where mortgages are generally unknown.

### *Seeking a Livelihood*

The present back-to-the-land movement differs from most of the population readjustments the country has previously experienced. When hosts of eastern Virginia and southern Maryland farmers moved westward during the period of low prices following the Revolutionary War, the impetus appears to have been due largely to the prevalent belief that the lands of those old farming sections had been so depleted by continuous tobacco culture and soil washing that agriculture was no longer profitable. The outlook of that period of readjustment was in the direction of more productive land and consequently better opportunity for profitable farming, across the Blue Ridge Mountains. So it has been with

the other major movements toward the land; always the underlying urge undoubtedly has been better opportunity for profit, either through increased production or enhanced land values. Free lands and the spirit of adventure dominated the action of great numbers, as a matter of course, but probably not of the majority.

According to all indications, as stated, profit is being thought of less in the present turning back to the farm than the matter of sufficiency of food and shelter. Also, if we may judge by a considerable amount of public expression, this present movement is carrying with it an additional purpose, one which probably means more than the average city dweller hitherto has thought very much about, —the finding of a place where one can be more independent than is possible with the uncertainties and cramping of urban life in times of low wages and scarcity of work.

### *Success for Some*

Most farm-reared residents readily confess to a persistent desire to go back sometime to the old home-place in the country or to acquire "a piece of land" where things can be grown, where long dreamed of crop experiments can be carried out, and where the lungs can be filled with invigorating fragrance of freshly turned soil. These and other rural values—the call of out-of-doors, the freedom and expansiveness of life in the country, and the healthfulness of farm activities—largely lie beyond the understanding of native-born urbanites. It is doubtful if the average city-reared individual can readily gain a true perspective of these assets of the countryside. Nevertheless, there are likely to be, for a while at any rate, valiant attempts to acquire closer fellowship with the beatitudes of life beyond the ends of lighted streets, such as have not been entirely overlooked even under the stress of the present low ebb of farm commodity prices. Disappointment and failure will be the reward of some; others will succeed by reason of exceptional adaptability or through sheer necessity.

Farmers have lost heavily during recent years. Many have been dispossessed of all property; some have succumbed to grief entailed by these losses. Probably, however, a considerable majority have retained at least a clear title to a sustaining spirit of hopefulness and resourcefulness. This is the conclusion, generally, of those who go out into country districts and intimately discuss with "dirt" farmers the problems of their immediate future. Here is found little fear of the possibility of larders run empty or of lack of fuel or shelter.

In these reflections our thoughts go back to former periods of low prices and unpromising outlooks on the farm. We are reminded of long, lean years during the nineties. If we recall, for example, the conditions in the hard-hit region of the old cotton belt, it will be remembered that there, as elsewhere in the cotton empire, the price of the staple for a long time ranged from around five cents a pound to an occasional peak of eight cents or a little more. During this period of adversity, it will be remembered, also, that numerous farmers managed to steer a safe course by methods which seem to have been all but forgotten.

### *A "Live-at-Home" Plan*

The writer recalls a representative farm family of the Carolina Piedmont section which managed to get along during that lengthy period of economic harassment so successfully that nine children were sent to college solely on the proceeds of the plantation. When the owner died about 15 years ago, no mortgage or indebtedness of any kind stood against the place. In this instance success had come because the "live-at-home" plan of farming was operative in the fullest sense of the word.

Usually, there was ample production of corn, wheat, potatoes, milk, butter, chickens, turkeys, eggs, hogs, beef,

honey, and a long list of vegetables for home needs, with frequent surplus for sale. Whatever cotton was grown was largely on the surplus side of the farm ledger, so that the price did not entirely govern the economic situation. This was ginned on the plantation and compressed by horse power. All blacksmithing, horse-shoeing, and iron repair work were done in the farm smithy and carpenter shop. Nails and staples were made of scrap iron, even plows, bolts, nuts, and washers. The life of a farm wagon was almost endless. If a part broke or wore out, whether of wood or iron, it was quickly and efficiently replaced, usually without one cent of expenditure. Home-made fertilizer was liberally used. This was "compost" made of forest litter, cottonseed, and barnyard refuse, heaped stratum on stratum, with a sprinkling of Kainit and often of acid phosphate, after the manner of an enormous layer cake.

### *Made Own Clothing*

There were home-knitted socks of homespun cotton, and cloth woven on the looms of "Aunt Jane," a remarkably versatile ex-slave. This cloth, dyed bluish with a concoction of copperas and tulip-poplar bark, was of extraordinary durability. Leather from a nearby tannery was used for the making and repairing of shoes.

Flour, meal, and grits were ground at neighborhood grist mills; and "big hominy" was made at home with ash-hopper lye. Fragrant hickory-smoked hams, link sausage, bacon, and hog-jowl always hung in the smokehouse. Red pepper, sage, horse-radish, and other condiments came from the home garden, where grew also lavender for the benefit of clothes chests. Coffee, on occasion, was brewed of parched okra seed. Sometimes this was sweetened with sorghum syrup or brown sugar crystalized from home-made syrup. (It is recalled that a cup of this particular brew rather dismally failed as a source of good cheer.) A preacher-farmer of the plantation's colored population, "Uncle John," who was also a masterful hunter of 'possums and the Carolina snapping turtle, manufactured his own cooking soda.

Thus, so recently as little more than a generation ago many of the old-time cotton plantations were profitably operated through the hardest of hard times. The profits were not large, to be sure, but that the cost of farming was better than balanced in many instances speaks well of the old system. Another point worth recalling is that farm mortgages were neither so prevalent nor so burdensome then. Not only this, but many of the larger farms were places where life was lived cheerfully. There were parties, picnics, fishing, and hunting, with visitors every summer and often during winter. A brother or sister returning from college marked an event of vast enjoyment, calling for special celebration.

### *Change to Commercial Farming*

This situation has undergone a tremendous change since that time of self-sufficiency on the better operated farms of the region. The change has been in the direction of commercial farming. It began with the speeding up of industrial building about the close of the last century. Good roads, automobiles, telephones, moving pictures, and other innovations linked with modernity accentuated the transmutation. The growing of soil-improving and feed crops was almost dispensed with on thousands of cotton farms. Many operators plowed up their garden sites and planted them to cotton.

It cannot be shown that these profound changes, and their catalytic reactions, have produced only advantageous results. Tenantry permeates the entire empire of cotton. In some sections a few plantations have retained some minor characteristics of the old order, but great numbers of small producers and not a few of the large class are now living frugally.

During the period immediately preceding the World War, the incomes of many of the small growers, operating on good land, were sufficient for at least a comfortable standard of living. Their houses were generally livable. Many of them were painted, and old-fashioned flowers grew in the yards. Now, with the passing of that stage of prosperity and the shorter subsequent stages of peak prices during and after the war, it appears that drastic shifting of plans cannot be avoided. The shifting is actually in progress. How far it will go is impossible of prediction at this time, but it seems certain there will be a very considerable degree of turning back to the self-sufficing type of farming that prevailed toward the close of the nineteenth century.

There is inspiration in recalling the era of rural contentment that prevailed in many parts of the southeastern cotton country during the last quarter of the last century, as well as food for reflection on the part of those inclined to see only discontent ahead. That stage of farm life typified at least one phase of America's robust rural independence, that is, self-containment with respect to primary necessities. With the tide again running in that direction, one discerns a degree of regional hopefulness that contrasts sharply and reassuringly against the gloom so frequently encountered in some other quarters. Other regional assets of an intangible nature deserve more than a fleeting thought.

Farm preparations in the cotton belt proceed leisurely during the winter, but in springtime comes a rush of plowing and seeding. As of old, the field hands sing loudly and cheerfully. The folk-songs still to be heard up and down the "sandy bottoms" of Dixie continue to be varied and tuneful. These melodies rise to optimum volume in July, preceding the close of the season of cultivation; in October they vary to a cadence of plaintiveness, matching the subdued stimulation that marches with the tide of coloring foliage.

"Laying-by" time on cotton farms has always marked a joyous hiatus between the completion of the year's cultivation and the beginning of harvest. Over most of the region this well-earned recess extends from late July to late August. Now tenant and landlord find wholesome respite from the exacting requirements of the growing crops. Fields are left to the tender mercies of rain and sunshine. "Big meetings" call hosts of ruralists and some townsfolk to numerous country churches. Essentially, these are annual community gatherings where affairs of the sacred order indiscriminately mingle with neighborhood gossip and baskets sumptuously laden with pound cake and fried chicken.

Not a few complete their programs of long-distance visiting at this time of the year; others go fishing, picnicking, or camping. The majority remain more or less at home, making neighborly visits and "taking life easy." This kind of vacation is not necessarily all dreariness. Seldom does torpid heat lie heavy over the land of cotton. Afternoon breezes from the Gulf or the Atlantic brush away the burning sultriness that sometimes characterizes the dead heat of inter-continental areas. Under such conditions, "just sittin' " is a form of recreation not to be despised. Delicate fragrance spreads over the cotton fields. The miracle of countless blossoms, changing from natal yellow of forenoon to

delicate pink with the setting sun, and finally to deep pink the following morning, is always an intriguing spectacle. Those who live by the side of cotton fields have an imminent affection for them. It is the same environmental result that makes the rustle of corn leaves a merry sound to the Iowan.

October morning! Like phantom mountains, cumulus clouds parade the heavens. Beneath them thirty to forty million acres of fleecy cotton are gleaming in autumn's warmth. The cotton harvest is on. Every day hundreds of thousands of human machines, long sacks strapped to shoulder, march up and down the fields gathering with their hands fluffy balls of snowy fiber. Upon sheets spread by the side of fields sackful after sackful of silken whiteness is heaped, the diminutive piles of early morning grown into cone-shaped hillocks before the setting of the crimson harvest sun. These, representing the day's labor, are weighed, recorded, and hauled to the nearest gin. Payment for the week's work is made on Saturday.

Picking cotton is a laborious task, but always an element of festivity goes with it. Mellow sunshine invades the fields. The product is the emblem of cleanliness; at the time of its harvesting a delicate fragrance of maturing foliage spreads over the countryside. The pickers sing as they toil, gossip, and obviously enjoy their work.

### *A Recreational Side*

These observations are given to emphasize the fact that, though life on the farm is not all play, there usually is associated with it considerable activity of a recreational nature. This phase of the business of agriculture is by no means restricted to the cotton belt. It is evident in almost every type of farming. And it extends even to the realm of athletics, in the form of exciting championship contests. The best cotton or apple picker, the champion corn husker, the loudest hog caller, the best milker, the most expert roper of steers, the rider of unridable horses, the producer of the highest acre yields of this or that crop, the owner of the hen that lays most eggs come annually into the limelight of communities, counties, states, and even the nation. Silver cups, scholarships, trips to Washington, and other rewards are meted out for these achievements.

### *Longing for "Home"*

Even the fragrance of the soil, to consider another of the many attributes of the bucolic estate, has its charm for those who have known it. Last year an erstwhile Michigan farmer, who had spent many years on a large plantation in the Tropics, while complaining to the writer of the things he had missed as the result of expatriation, said: "These tropical soils have no smell; I have missed that in this country. It was always a pleasant feature of spring plowing back in Michigan. Before I am too old to enjoy it, it is my intention to go back to the old farm; it calls me more and more. There are many things to be caught up on back there—a lot of fishing and other matters. I haven't forgotten the cheerfulness of the cackling of a good old Michigan hen, nor the spring song of meadow-larks. This country doesn't exactly match my requirements. The aroma of rich plowed dirt, I cannot get it out of the blood. Hang it all!—I am going back."

Man's inherent love of the land and the beneficence of rural life, such as have been indicated, were forcefully brought to the attention of the writer by two recent experiences, one in Mississippi, the other in the cane fields of Cuba. In the former instance an isolated clearing was encountered in the "Piney woods," a dozen miles inland from the Gulf coast. Here an ex-sailor was plowing a field of young potatoes. Having sailed the Seven Seas, he had bought 80 acres "to settle down on." To the retired seaman,

(*Turn to page 59*)

Plate I. Peas growing in the nutrient solutions outdoors. Note the stunted growth of the F (low potassium) series.

# Potash Makes Quality Peas

*By J. D. Romaine*

New York, N. Y.

MANY canners and farmers have believed that potassium, especially in the muriate form, tends to make the skin or seed coat of peas tough, resulting in a low-quality canned product. Recent work published by C. B. Sayre, B. R. Nebel, J. J. Willaman, and Z. I. Kertesz of the Geneva Experiment Station has shown that this is not the case at all. Carefully conducted and repeated experiments under varying conditions definitely proved that the presence of potassium in the nutrient medium and in the skin caused the skin to be more tender than when there was a lack of potassium. Toughness in the skin was closely correlated with a high-calcium content.

When growing peas for canning, both quantity and quality are important, but one must usually be sacrificed for the other. The authors seek to combine to the highest possible degree quantity and quality, and to this end first consider those factors that determine quality in canned peas. By far the most important factors are tenderness and flavor, followed by clearness of liquor, freedom from broken peas and defects, and uniformity of size and color. Flavor is probably influenced to a large extent by sugar content.

The authors believe that tenderness is of paramount importance and investigated this phase of the problem from the chemical and mechanical

viewpoints. Tenderness of the pea is influenced largely by the condition of the seed coat and by the firmness of the cotyledons. Mechanical appliances to measure the force necessary to puncture the skin and also necessary to crush the peas were used. Results with these puncturing and crushing tests on the green peas were correlated with the quality of the canned peas. It was found that these tests could determine fairly well which peas would can in the "fancy," and which in the "extra standard" grades. Both tests gave more or less parallel results. In the study of the tenderness of the skin, the puncture test, which primarily measures this quality, was used. Use of these tests on the cooked peas was of no value.

### *Maturity Important Factor in Tenderness*

Several similarly treated varieties were tested, and differences in puncture and crushing values could be correlated with variety. Since varieties are largely a local matter, they will not be considered further.

Peas were grown in the field and in water culture with various treatments, the potassium and calcium treatments especially being varied. Mechanical and chemical tests of peas at various stages of growth showed that there were definite and marked changes in the peas as they approached maturity, regardless of treatment. As the peas grew older, they naturally became larger, with a lower percentage of the smaller sizes; the skin tended to become tougher, as shown by the puncture test; the peas became definitely harder, as shown by the crushing test; sugars decreased; starch increased; dry matter increased; protein increased; and the calcium content of the seed coats increased. All of these increases tend to reduce quality of the pack, thus showing the importance of the time of harvest.

### *Calcium in Seed Coat Causes Toughness*

The very definite tendency for calcium to increase in the skin was further investigated by the authors. For this investigation they grew peas in water culture with six treatments containing high and low calcium; high and low potassium, grown in the green house; and the high and low-potassium treatments grown out-of-doors. All other necessary nutrients were added. When low potassium was used, a sufficient amount was present for a fair growth, but not for maximum growth and yield. The low-calcium treatment made surprisingly good growth and yield for the small amount of this nutrient present. The high-calcium and high-potassium treatments contained more than enough of these nutrients to produce maximum growth. The peas made a good growth, which can be seen in Plates I and II. The peas were harvested and analyzed, and the seed coats were tested by the puncture test; thickness was measured; and calcium and potassium contents were determined. The results of the latter are summarized in Table I.

TABLE I.—Relation of Thickness of Seed Coat and Lime Content to Toughness

| Nutrient Treatment | Puncture Test, Gms. per Sq. Cm. | Thickness of Seed Coat, (Microns) | Analysis of Seed Coat Dry Basis | |
|---|---|---|---|---|
| | | | CaO, (Per Cent) | $K_2O$, (Per Cent) |
| A, low Ca ..... | 33.8 ± .47 | 160 ± 8 | 0.170 | 2.70 |
| B, high Ca .... | 37.3 ± .57 | 203 ± 10 | .222 | 2.26 |
| C, high K ..... | 44.5 ± .62 | 205 ± 10 | .249 | 2.40 |
| D, low K ..... | 47.0 ± .74 | 161 ± 8 | .257 | 1.87 |
| E, high K ..... | 52.1 ± .36 | 208 ± 10 | .258 | 2.30 |
| F, low K ..... | 53.0 ± .58 | 163 ± 8 | .429 | 1.69 |

It is evident that an increased supply of calcium increased the toughness (puncture test), the thickness, and the calcium content, but lowered the potassium content of the seed coat. Thus, high calcium made a tougher seed coat; a fact which agrees with numerous observations by the authors and other workers. These relationships seem to be very marked and consistent, and are some of the most important facts brought out in these papers. The effect of calcium on the thickening of the seed coat is shown in Plate III, A and B.

Potassium also thickened the seed coat by about one-quarter, as shown in Plate III, C and D, and E and F, as well as in Table I. However, thickening of the seed coat did not increase its toughness, but had the opposite effect, shown by the low-puncture value in the high, compared to the low-potassium treatments. Plate III shows that the increased thickness of the seed coats is due to longer palisade cells.

The analyses show that the calcium content of the skins was higher with the low-potassium treatment, while the potassium was lower. There appears to be an indirect relationship between calcium and potassium, which is substantiated by other work. The potassium content of the skin appears to be largely influenced by the calcium present, as well as by the amount of potassium available in the growing medium. The table shows that the highest potassium content in the seed coat occurred when the calcium content was lowest, and not when the potassium supply was highest. This inverse relationship between calcium and potassium was found also in other parts of the plant.

Magnesium also has an inverse ratio to calcium, being similar to potassium in this respect. Indeed, the magnesium-potassium ratio is very consistent.

While the mineral composition of the plant varied considerably, the sugars, starches, and nitrogenous materials were about the same, regardless of treatment. There were indications that when potassium and calcium were low, they were translocated from the older to the younger growing parts. There were indications that the cells in the high-potassium plant were functioning better, shown in Plate IV, E and F. The cell of the cotyledon of the high-potassium plant was larger, with larger and more numerous starch granules, and had other characteristics of a better functioning cell.

### *Potassium Leaves Skins After Shelling*

Due to soil and possible other factors, such consistent results were not obtained in the field trials. It was found that peas with a higher lime content had a higher crushing value. This is in line with the results of the water-culture results. When the peas were shelled, lime moved quickly into

**Plate II. Typical plants from each nutrient solution in the greenhouse.**

the skin, and potassium had a tendency to move out, making the peas tougher. This substantiated the claim of packers that the quality of the peas deteriorates quickly after passing through the viner.

There was evidence that potassium tended to delay maturity in some cases; in other cases it seemed to be of little influence. This held true whether the potassium was used in the muriate or sulphate form.

Growing peas on a soil with several degrees of acidity showed that the greater the acidity, the more lime there was in the skin of the peas. This is surprising, since the less acid plots were produced by adding lime to the soil. This lime apparently did not find its way into the seed coat.

The authors seek to ascertain whether one of the tests used can be adapted to determining the best time to harvest peas to obtain the largest yields consistent with high quality. At present, the time of harvest is de-

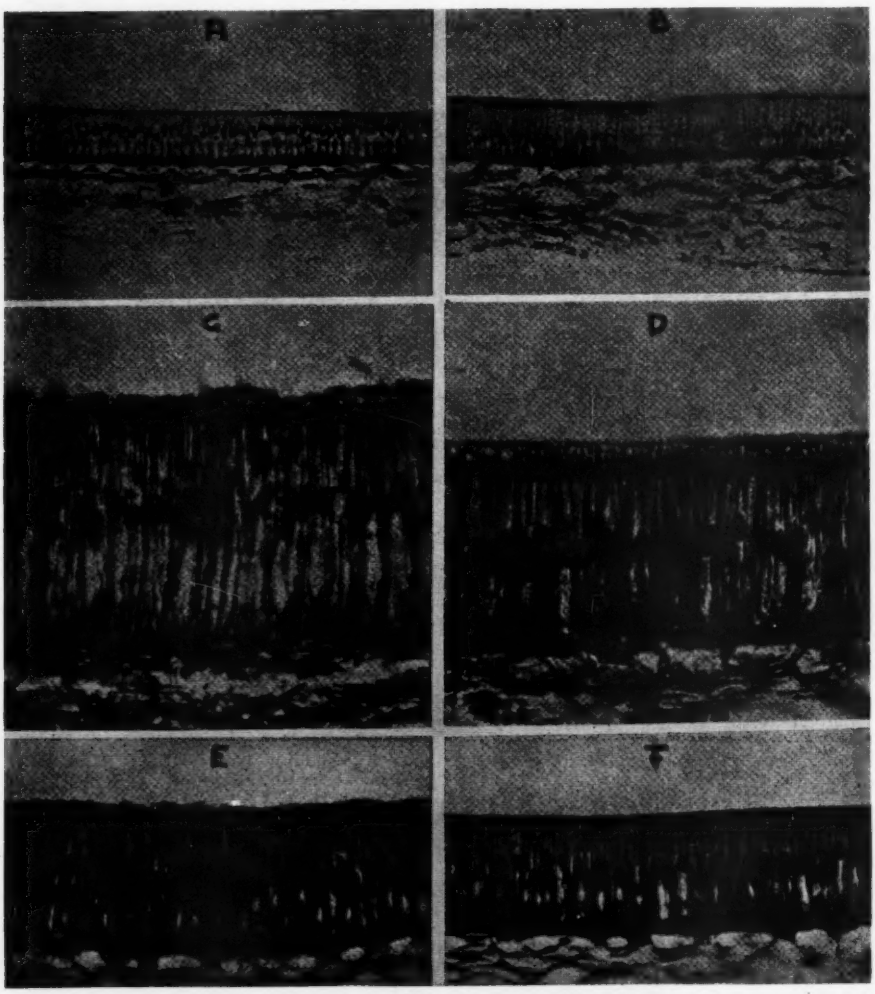


**Plate III. Cross sections of seed coats. A. Low calcium x 80; B. High calcium x 80; C. High potassium x 315; D. Low potassium x 315; E. High potassium x 170; F. Low potassium x 170.**

termined largely by the judgment of the field man of the canning company. It is brought out in this work that the optimum time of harvest covers a relatively short period and the test should be one easily and quickly performed. The puncture and crushing tests seemed to fill this need quite satisfactorily. These tests are quickly

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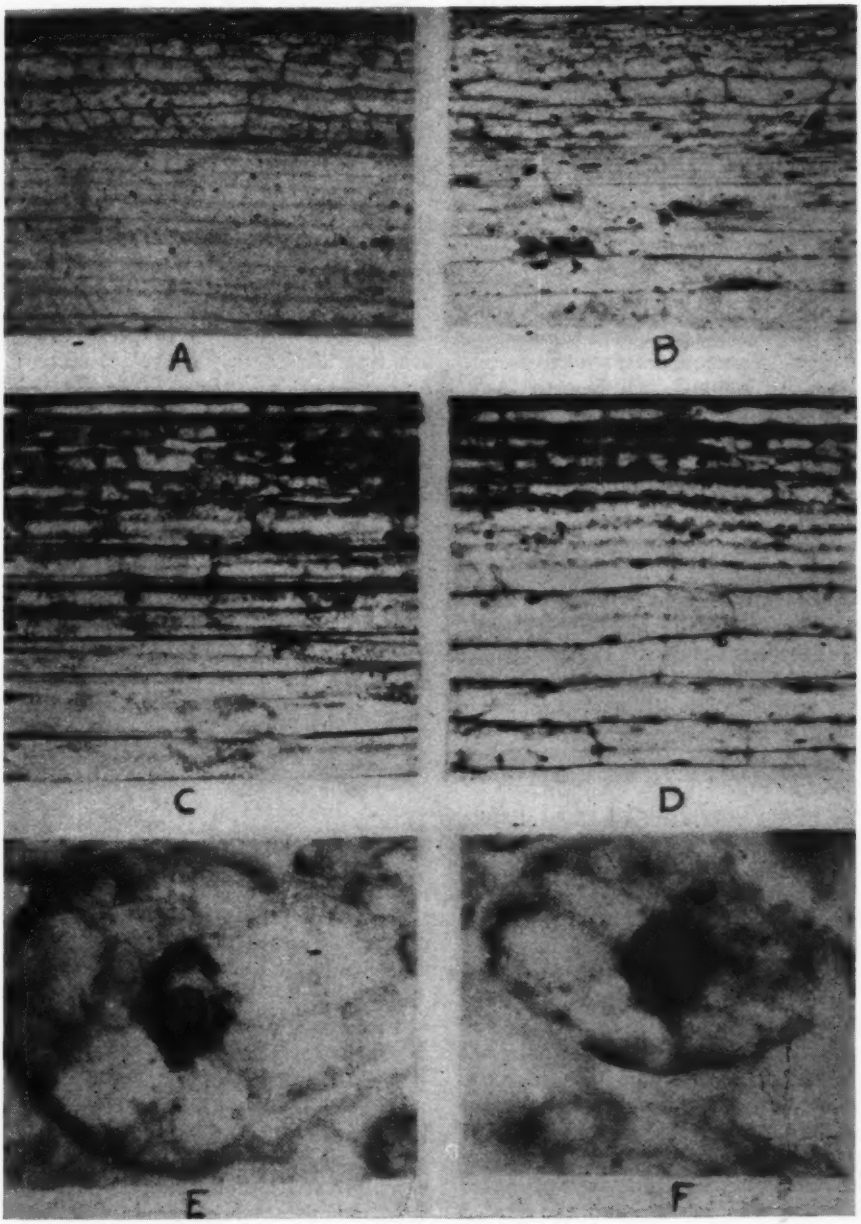


**Plate IV. A. Longitudinal section of stem. Low calcium; B. High calcium; C. High potassium outdoors; D. Low potassium outdoors; E. Typical cotyledon cell. High potassium x 480; F. Low potassium x 480.**

# *The* Inquiring Mind *and the* Seeing Eye

*By Dr. A. S. Alexander*

University of Wisconsin

ACCORDING to Milton, "A good book is the precious life-blood of a master-spirit embalmed and treasured up on purpose to a life beyond life."

That, truly, may be said of some of the many books written by Liberty Hyde Bailey, who was professor of horticulture at Cornell University, New York, from 1888 to 1903, and dean and director of the College of Agriculture there, from 1903 to 1913.

All of his hundred or more publications have been worth while, and several of them "weighty tomes" which he prepared and edited at the expense of a vast amount of work and time. They include: Annals of Horticulture, 5 vols.; a Cyclopedia of American Horticulture, 4 vols.; a Cyclopedia of American Agriculture, 4 vols.; Standard Cyclopedia of Horticulture, 6 vols.; a Rural Manual Series; Rural Science Series; Rural Text-book Series; Rural State and Province Series; and an Open Country Series. Then there have been notable books on principles of plant-breeding, fruit-growing, forcing, principles of agriculture, evolution of our native plants, lessons with plants, botany, practical gardening, principles of vegetable gardening, pruning, training of farmers, beginners' botany, rules for farm and garden, horticulture, nursery management, the apple tree, and the garden lover. While connected with the Cornell Experiment Station, he also wrote 60 bulletins and edited many more. He edited The American Garden from 1890 to 1893, and Country Life in America from 1901 to 1903. He produced: The Country Life Movement, 1911; York State Rural Problems I, 1913; II, 1915; and the popular biographical volumes of Rus for 1918, 1920, 1925, and 1930; Gentes Herbarium; and others.

### *Self-Expression*

Apart from the intensely practical and technical books he has written or edited, he has issued many of an entirely different character, disclosing the versatile abilities of the man and certain opinions, beliefs, longings, and aspirations of the soul within him, which always has struggled for freedom and expression. His books of the latter more or less individual and original type include: The State and the Farmer, Talks Afield, Nature Portraits, Survival of the Unlike, The Nature Study Idea, Outlook of Nature, The Holy Earth, Ground Levels in Democracy, What Is Democracy, Wind and Weather (Verse), The Seven Stars, and The Harvest.

The Bible says that "Of making books there is no end" and that "much study is a weariness of the flesh," but amid his tremendous undertakings in agricultural text-book production and his eminently successful work as a college executive and professor, Lib-

erty Hyde Bailey has found time for intimate commune with nature, study of her marvelous works, and day-dreaming about the mysteries of the earth, the fields, the forest, the waters, the skies, of life below, and the life to come. He has sought to know the Creator in His creations; and few inquiring minds and seeing eyes have discovered in the scene around him more beautiful lessons, unseen or uncomprehended by more materialistic men, and painted them in more pleasing speech and written words of prose and poetry for their edification and delight.

To the writer, looking on and wondering these many years, Liberty Hyde Bailey has appeared a dual personality, with his feet on the earth and his head in the clouds. In one phase he has been the plodding practical worker, teacher, and executive; in the other, the dreamer, poet, and philosopher, seeking to escape from the incubus of mundane affairs and to find surcease from weariness in the blissful realms of the ethereal and spiritual world. Withal, he has sought earnestly, as a duty to which he has deemed himself born and called, to open, so far as possible, the eyes and hearts of his fellowmen to nature and her beauties in the common-day environment.

Francis Bacon said, "A little philosophy inclineth a man's mind to atheism, but depth in philosophy bringeth men's minds about to religion." That, Dr. Bailey has found true as the result of his deep deliberations, when he has been able to free himself from the humdrum of his work-a-day labors. He tells me so in one of his writings, saying, "All beliefs, all doctrines, all creeds are mine. I want only the truth and the privilege to live in the great, good world. Truth and the quest of truth are always safe. It is not my part to be anxious about destiny, or about the Universe. If my tiny opinions are outgrown, I shall wait, in patience and hope. There is grateful release in letting the Universe take care of itself. The Universe is in better hands than mine. In these matters I will substitute trust for faith. . . . We are coming to a religion of joy and activity, full high spirituality, of great trust in Nature, of hope in man, and

of direct dependence on the Almighty."

The subject of our sketch was born in a farm house at South Haven, Michigan. He had a grand start in life, for his parents, Liberty Hyde and Sarah Harrison Bailey, were fine pioneer folk of the efficient, rugged type that developed the farms of the country. Breeding certainly tells in the character of a child, and the great naturalist, botanist, horticulturist, author, and executive-to-be reflected that of his sire in all of his best qualities. Liberty Hyde, Senior, is said to have been a man of sturdy character, "with strong attributes of body, mind, and heart." He was a successful fruit-grower and farmer, who had met and overcome all the trials and vicissitudes of the aggressive and purposeful pioneer. A portrait of Dame Bailey shows that she, too, was of sterling character, and she doubtless endowed her son with some of the finer fibers of his being.

### *Learned Practical Lessons*

It was while working on the paternal fruit farm, near the southeastern shore of Lake Michigan, that the son learned practical, enduring lessons in horticulture and developed a deep-rooted love of nature. There he grew up, attended the village school, and pursued his studies until ready for admission to the Michigan Agricultural College. There he learned to labor diligently with his hands and found time to follow his natural bent for investigation of nature's marvels. As leisure allowed, he roamed about and spent many happy hours in the fields and woods, on the hills and by the stream-sides, studying and becoming intimately acquainted with every living thing, and collecting and preserving many fine specimens from the plant and insect world. Soon he learned to classify his treasures; then he collected and mounted a large number of insects, which he presented to the South Haven and Casco Pomological Society, of which he was a member.

In a notebook, he recorded his observations of plants, birds, and insects, and the miracles wrought by the changing seasons. Thus, early, he became an investigator of the subjects he was thoroughly to master in later life. Of the brook, which was to him a source of wonder and delight, he wrote: "It became my teacher. I watched for the suckers that came up from the river to spawn. I made a note when the first frog peeped. I waited for the unfolding spray to soften the bare trunks. I watched the greening of the banks, and looked eagerly for the bluebird when I heard his curling note somewhere high in the air."

From this close boyhood association with nature, he developed the broad vision, deep reverence, and sympathetic knowledge of her every mood and phase that were to make him a master teacher and inspiring guide in manhood's days.

When fourteen years old, he read his first book that described, named, and classified many of the plants he had learned to recognize and love. It was Asa Gray's Field, Forest and Garden Botany, and it enabled him intelligently to advance his investigations. Many years later he revised that precious book, which had been his earliest mentor.

### *Started Writing Early*

Even prior to his college days, young Bailey demonstrated his innate literary abilities by the essays he read at meetings of the local Pomological Society. They are said to have attracted marked attention by their graceful, yet simple and forceful style, as well as their useful matter. In 1877, when nineteen years old, he became a student at the Michigan Agricultural College. There, he was an apt and earnest scholar. Soon, he made

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A good crop of well-fertilized tobacco nearly ready for harvesting in Norfolk county, Ontario.

# Tobacco "Magic"

*By F. C. Paterson, B. S. A.*

Agricultural Representative, Norfolk County, Simcoe, Ontario

A TREMENDOUS change has come to Norfolk county, Ontario, during the past five or six years. The spectacular development of flue-cured tobacco growing has had, at times, some of the aspects of a gold rush. Millions of new capital have poured into the district; hundreds of farms have changed ownership; thousands of new people have come. The scenes have completely changed; business and outlook have changed.

Ten years ago the sand lands of Norfolk and adjacent townships were considered to be the poorest in western Ontario; sand drifted across roads that were merely crooked trails between the fences. Rye was the common grain crop, because little else would grow. Pastures were sparse, and generally speaking the farms and the farmers were getting poorer and poorer each year. The west Norfolk farmer was an object for sympathy, often expressed by those better off who happened to have clay loam land.

Flue-cured tobacco had been grown in Canada in Essex county near Leamington for about 25 years before it was tried to any extent in Norfolk. Thus in Ontario as well as in the Southern States, there is an "Old Belt" and a "New Belt." The development in the "New Belt" commenced near the village of Lynedoch, but has spread over most of the sandy acres of Norfolk county and into Elgin and Oxford counties which lie west and north of Norfolk. A glance at the following figures shows the rapidity of the growth of the business.

In 1925 about 60 acres were grown;

in 1926 about 200 acres; in 1927 about 1,300 acres; in 1928 about 5,000 acres; in 1929 about 10,000 acres; in 1930 about 15,000 acres; in 1931 about 23,000 acres; and in 1932 about 26,000 acres.

Incidentally those sandy trails of 10 years ago have been replaced by roads that carry 10 times the amount of traffic. New buildings have been erected; old ones repaired; and 4,000 tobacco kilns required to cure the tobacco on 800 farms that dot the landscape. In 1931 the tobacco crop sold for more than all the other crops of Norfolk combined. In 1932 about 10,000 people all told were engaged in harvesting tobacco.

### *Has Gained Reputation*

A very high quality of bright leaf is being produced in the Norfolk district. This fact is now recognized by those who are most deeply interested in growing the crop, trading in bright leaf tobacco, or manufacturing it the world over.

Formerly most of the flue-cured tobacco used in Canada was imported. Now most of that consumed in the country is produced at home, and each year less and less is being imported. In addition to this, an export market in Great Britain rapidly is being enlarged.

The type of soil which is considered most adaptable to this crop is known as Fox Coarse Sand. Norfolk has a soil map, the result of a soil survey made by the Department of Chemistry of the Ontario Agricultural College in 1926 and 1927. This survey and map have been of considerable value to those interested in "tobacco land." Some of the crop is grown on other types of soil, such as Plainfield Sand, Oshtemo, Fox fine sandy loam and Fox gravelly loam. The type of soil selected is of paramount importance. The climate of the district has been proven to be suitable. Although danger of frost late in the spring and early in the fall must be admitted, experience has shown that most of the crop has been successfully matured each year. Weather records show that the district has an average frost-free period of 135 days.

A large percentage of the tobacco crop in the Norfolk district is grown on the share-farming plan, the owner

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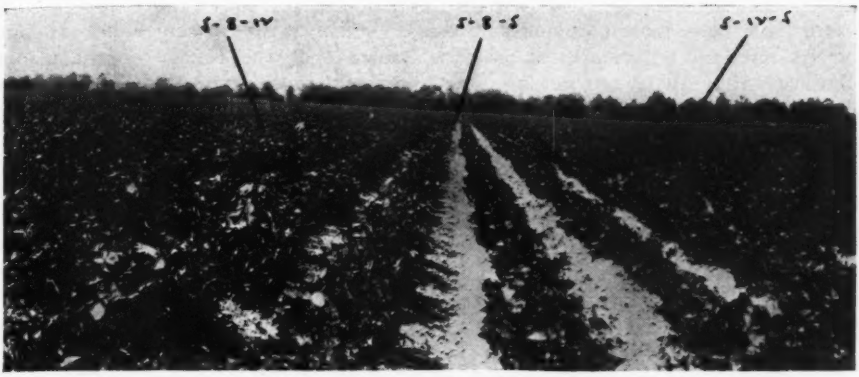
**Applying fertilizer to experimental plots of flue-cured tobacco. Fertilization is probably the most discussed problem of this sandy district.**




The responses to the different fertilizer treatments were easily seen in the growth of the lima bean plants.

# More *and* Better Lima Beans

*By George R. Cobb*

Salisbury, Maryland

ACCORDING to the latest census there are 1,500,000 cases of lima beans packed in this country. Of this amount more than 800,000 cases are grown and packed on the DelMarVa Peninsula where about 15,000 acres are devoted to the production of lima beans for canning purposes. Sussex county, Delaware, is probably the leading lima bean section of the United States.

Associated with such an enormous acreage are the trials and tribulations common to many of the agricultural crops. Experimental work relative to insect and disease control, varieties, cultural methods, fertilizers, and other problems, is constantly being conducted to further increase yields and at the same time improve quality.

The growers have learned, for instance, that the best type of soil is a rich loam; that lima beans are not tolerant of soil acidity (nor will they grow well on a neutral or alkaline soil) but thrive best in a soil having a pH of from 5.4 to 6.0; that rows should be about 30 inches apart; that spraying or dusting with magnesium arsenate at the rate of two to three pounds per hundred gallons of water will control the Mexican Bean Beetle; and that the small-sized pods make hand-picking impractical.

One of the best varieties for canning purposes is the Henderson Bush Lima, and the major part of the acreage is devoted to this variety.

A problem, ever present and ever important, is that of the proper fertilizer to apply, both from the standpoint of analysis and amount per acre. Although a 4-8-4 and a 5-8-5 at the rate of from 400 to 600 pounds per

acre have been most commonly used, many tests and experiences of growers indicate that these are not the best analyses.

In an effort to ascertain, if possible, more definite indications as to the most efficient fertilizer to apply to lima beans from the standpoint of yield, quality, and cost, several tests were conducted with growers on the Peninsula. Believing from previous tests and experiences that five per cent nitrogen approaches the optimum for that element on lima beans, it was held constant and only the percentages of phosphorus and potash were varied.

Several different fertilizer combinations were prepared, such as a 5-8-5 where the organic nitrogen was only 25 per cent, a similar analysis where the organic nitrogen was increased to 75 per cent, a third mixture with the phosphorus content increased to 12 per cent, and a fourth combination where the potash content was inreased to 12 per cent.

The several mixtures—(1) a 5-8-5 with 25 per cent organic nitrogen, (2) a 5-8-5 with 75 per cent organic nitrogen, (3) a 5-12-5, and (4) a 5-8-12 combination—were applied to a field where the same methods of culture and same crops had been employed for the past five years. Thus each plot was similar in that it had had the same conditions for five years. An acidity test showed no need of lime and no plot received a lime application.

During the growing season it was noted that the foliage of the plants on the high-potash plot displayed a deeper green color, and as the time for maturity approached, it was evident that the beans on this plot were further advanced in ripening than those on the other plots. Incidentally, this matter of early maturity from high potash has been observed on all tests conducted with various crops under the soil and climatic conditions peculiar to the Peninsula.

This factor of early maturity is too important to overlook or underestimate, as with many crops the best prices are obtained when marketed early in the season. Tomatoes, for example, have been harvested from high-potash plots at least a week before any fruit was picked from plants on plots low in potash. Similar results have been observed with cantaloupes, cucumbers, and corn.

The beans from the several plots were harvested in the usual manner, that is, they were "plowed out," raked into windrows, loaded on to flat wagons, and hauled to the viner. Here they were pitched into the machine where the pods were cracked, allowing the beans to flow from the viner into flat boxes, ranged at the side of the machine. The beans were then weighed and graded, as prices are based on the number of pounds together with a difference in price per pound depending upon the percentage of white beans present.

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| Plot | Fertilizer | Amount | Yield lbs. | Value 4 Cents per lb. |
|---|---|---|---|---|
| 1 | 5-8-5 | 500 | 1,848 | $ 73.92 |
| 2 | 5-8-5 | 1,000 | 1,952 | $ 78.08 |
| 3 | 5-12-5 | 500 | 2,256 | $ 90.24 |
| 4 | 5-12-5 | 1,000 | 2,208 | $ 88.32 |
| 5 | 5-8-12 | 500 | 2,488 | $ 99.52 |
| 6 | 5-8-12 | 1,000 | 2,944 | $117.76 |
| 7* | 5-8-5 | 500 | 2,152 | $ 86.08 |
| 8* | 5-8-5 | 1,000 | 1,912 | $ 76.48 |

* These two plots had a fertilizer with 75 per cent organic nitrogen as compared with only 25 per cent on Plots 1 and 2.

# The Artichoke Turns Samaritan

*By L. K. Soth*

Iowa State College, Ames, Iowa

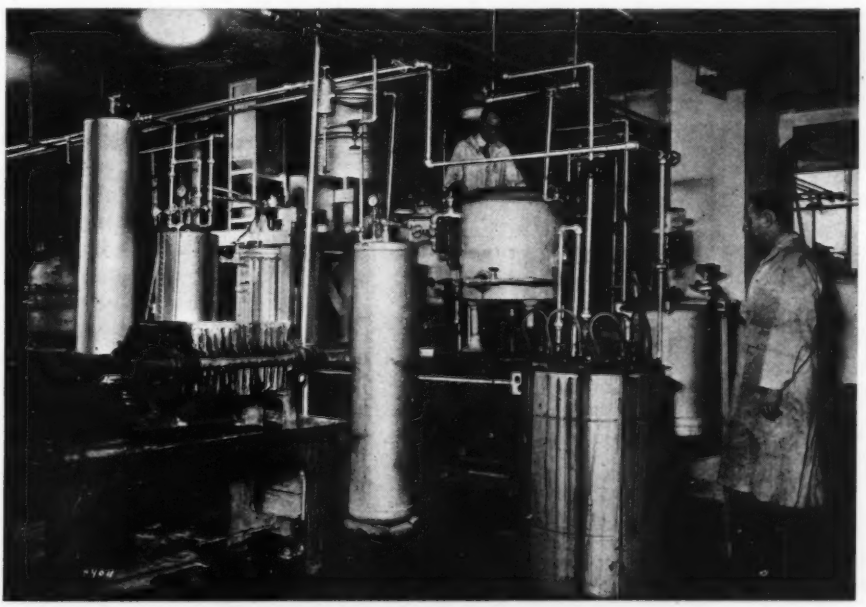
ABRAHAM LINCOLN was a backwoods rail-splitter — he became President.

Napoleon was a corporal — he became Emperor.

The Jerusalem artichoke was a weed to Midwest corn growers — it now may become a crop of commercial importance.

Like many who have risen from lowly status to renown, the artichoke got a "break." That break came when chemists at Iowa State College discovered that levulose sugar, the kind found in fruits, could be manufactured from the tubers of the artichoke more cheaply than it could be refined from fruits.

Levulose sugar is sweeter than any other kind of sugar. Doctors knew that it could be eaten by persons suffering from diabetes. But nobody had been able to produce it cheap enough to make it practical as a substitute for



**This is the equipment used at Iowa State College to refine levulose sugar from the tubers of the Jerusalem artichoke.**

cane or beet sugar for diabetics. Then the Jerusalem artichoke came through to be the Good Samaritan for thousands of sufferers who, though their "sweet-tooths" are potent, cannot eat sugar. Though it has not yet reached commercial importance, there is every reason to believe that in the future the process will provide at least a limited market for the artichoke.

The Jerusalem artichoke is a perennial sunflower and belongs to the same genus as the common sunflower. It is native to North America and the tubers were used to some extent by the Indians for food. It is grown occasionally for food in this country, but more extensively in Europe.

Dahlia and chicory tubers are also capable of supplying levulose, but the artichoke is more easily propagated. The Jerusalem artichoke, in fact, can be grown on almost any kind of soil, the only requirement being that it be well drained. Heavier yields are secured on heavier types of soil, but harvesting is easier and cheaper and less soil adheres to the tubers at digging when grown on the lighter types.

There are several varieties of this crop. The French White, Improved French White, or Mammoth French White (it goes under all these names) of which there are several strains, is most commonly planted. A purple skinned variety, Purple Girasole, is grown in some sections, but did not yield as well as the other on the Iowa Agricultural Experiment Station grounds at Ames, Iowa, where it was tried.

### *Needs a Fertile Soil*

It is believed by the men who conducted the experiments on the growing of the artichoke that fertilizers commonly used for potatoes will be found satisfactory for this crop. They say that a 2-8-10 (2 parts nitrogen, 8 parts phosphorus and 10 parts potassium) fertilizer applied at the rate of 500 pounds per acre will prove satisfactory for most soil conditions.

Few soils are naturally stocked with enough available potash to give good yields. Either sulfate or muriate of potash may be used if potash is the only limiting factor in the soil. Stable manure is also valuable, if organic matter is deficient.

According to the investigators at Iowa State College, slow freezing and thawing in the ground does not injure the tubers, so that they may be planted either in the fall or the spring. One-half to one ounce seed pieces are used, each piece having at least one eye, the same as in planting potatoes. Six to seven bushels of seed are necessary for one acre.

The average depth of planting is about 4 inches, the seed being planted either by hand or by a potato planter. If a potato planter is used, the seed should be cut in blocky pieces. Rows

(*Turn to p. 56*)

**A field of Jerusalem artichokes under cultivation at Iowa State College, where the crop is converted into levulose, sweetest of sugars.**

Indiana grows quality sweets. Note the high percentage of No. 1's in this field-run sample.

# Gold Medal Sweets

*By W. B. Ward*

Extension Horticulturist, Vegetables, Purdue University

WINNERS in the Indiana Gold Medal Sweet Potato Club must have yield, quality, and grade in order to qualify for medals. Bronze medals are awarded for yields of 200 to 249 bushels; silver medals for 250 to 299 bushels; and gold medals for 300 bushels or more that grade better than 83⅓ per cent No. 1 sweets.

Previous to the organization of this club, southern Indiana sand farmers were getting around 150 to 175 bushels per acre. The sweets were long and lacked thickness, while the market was wanting thick potatoes or chunks. This presented a problem to these growers that was solved through the activities of this club.

When the club proposition was explained to the growers, there were many who expressed doubt of anyone even getting into the bronze medal group. A 300-bushel yield was just something to talk about. The result of the first year, 1930, was a record of 354 bushels of sweets per acre, with three other growers over the 300-bushel mark. The fourteen growers checked in 1930 had an average yield of 247.5 bushels.

In looking over the records of the growers, as to the kind and amount of fertilizer used, it was quite evident that those fertilizers with a higher potash content, in comparison to phosphate and nitrogen, produced the greatest yields with a higher percentage of No. 1's. Naturally, great interest resulted when these yields were

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# Fertilizing Lespedeza *in* Kentucky

*By I. J. Mathews*

Winamac, Indiana

DURING the last five years, Korean lespedeza has made a phenomenal march to occupy at present a million acres of Kentucky soil that otherwise would stand washy and nude during the year. The acreage in Kentucky has nearly doubled each year since 1926. Few other crops in the history of agriculture have made such a wild-fire spread.

On red clay that starts for lower levels with the first sprinkle of rain, lespedeza covers the ground, checking this run-off. The crop seems to thrive on soils that are in the lower registers of the soil acidity scale, in fact on soils so acid that the ordinary clovers will not grow. It is stated on good authority that lespedeza thrives better on limed soils; but where no other legume will stick during the first summer, lespedeza during the past five years has shown a wonderful adaptability to furnish a hay that analyzes like alfalfa, yet shatters enough seed on the soil to produce a good crop the coming year.

A single year often produces an unbelievable transformation in a field. Early August may show a bare, crumbly red soil, with thousands of tiny seams and yawning gullies. The same time the next August, the same ground growing lespedeza may carry a thick carpet of luxuriant hay. Later the thresher may turn out nearly 500 pounds of Korean lespedeza seed per acre. The seed is a brownish-black miniature of buckwheat, and when the hull is removed, it appears as a shiny black bead.

1—(No fertilizer) hay 960 lbs., seed 245 lbs.
2—(200 lbs. 0-10-0) hay 2,000 lbs., seed 511 lbs.
3—(200 lbs. 0-10-10) hay 2,960 lbs., seed 737 lbs.

While the plant as a field crop is so young and has opened up such a rich field of possibilities, few of its specific needs have yet been studied.

A demonstration on the farm of W. J. Hughes, who operated 327 acres in Meade

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# Depth of Application *of* Fertilizer

*By Wilbert C. Hopper*

New York State College of Agriculture

WITH the prevailing prices of practically all farm crops below pre-war, any increase that may be accomplished in the efficiency with which fertilizers are used is well worth the consideration of farmers everywhere. Results of experiments conducted on sandy loam soil of about average fertility at Ottawa, Canada, indicate that fertilizers should be incorporated into the soil deeply and thoroughly if the most use is to be made of them by cereal crops.

It has been well established that phosphate and potash fertilizers do not readily penetrate the soil. Potash, apparently, moves a little more quickly than phosphate compounds. There is experimental evidence, too, that even such soluble salts as nitrate of soda and sulphate of ammonia may not move into the soil very rapidly.

Many trials have shown that fertilizers applied in ordinary amounts with a fertilizer drill, which places the seeds and fertilizers close together, almost invariably return crop yields which are superior to broadcast applications which are not well worked into the soil. To make 200 pounds of fertilizers as effective as 300 to 400 pounds may be possible by better methods of application.

There are many farmers who do not have, and who are not in a position to purchase, combination fertilizer and grain drills but must apply the fertilizer required by their crops in a broadcast manner. The experiments to be described were made primarily for the benefit of these persons. "Scatter on the fertilizer, harrow it in lightly, and the rain will do the rest" is a theory which is pretty well exploded. The rain does not "do the rest" with phosphorus and potash fertilizers if, by this, is meant they will reach the plant roots of the crop sown the year the fertilizer is applied. In fact, it may take years for the phosphorus to penetrate the soil if it ever will. Mechanical means of getting potash and phosphorus fertilizers to a sufficient depth into the soil to be absorbed by the roots of the young seedlings appears to be essential. Fertilizers in close proximity to the seed appear to give a "kick" to the young plant which results in considerably larger yields per acre.

### *The Treatments Used*

The three fertilizer treatments employed in the Ottawa experiments consisted of applications, per acre, of 150 pounds of muriate of potash (50%), 500 pounds of superphosphate (16%), applied separately, and a complete home-mixed fertilizer applied per acre at the rate of 200 pounds of ammonium sulphate, 300 pounds of superphosphate, and 75 pounds of muriate of potash. Triplicate field plots, well-scattered and with ample untreated checks, were used for each treatment. The field on

which the fertilizer trials were conducted had been in oats the previous year. The stubble was plowed late in August, and the land was disk-harrowed twice before freeze-up. Each fertilizer was incorporated into the soil before sowing O.A.C. No. 21 barley in three different methods, namely, 1—plowed in to a depth of 6 inches, 2—disked in with a harrow, a two-horse disk being worked once each way, and 3—harrowed in lightly with a drag harrow. Of course the land where the fertilizers were disked or harrowed in had been previously plowed.

In every case the plowed-in fertilizers gave the largest yield (Table 1). The most striking results were obtained with muriate of potash and the complete fertilizer treatments. When potash was plowed in, the yield of barley was increased over the check plots by 6.6 bushels per acre. Disking in the potash fertilizer gave 5.7 more bushels per acre than no treatment. The increase in yields of barley by plowing in the complete fertilizer was 10.4 bushels per acre while disking in gave an increase of 5.1 bushels per acre. Harrowing in the fertilizer with a drag harrow, which leaves the fertilizer at a very shallow depth, gave practically the same yields as were obtained from the check plots on which no fertilizer had been used.

Observations in the field also indicated that the plowed and disked-in potash plots gave barley plants with larger heads and stronger straw.

The quality of the barley grains, as measured by the larger proportion of heavy kernels and the smaller amount of cleanings, was also superior where the fertilizers had been thoroughly incorporated into the soil.

While it might be relatively unsafe to recommend the general plan of plowing in fertilizers which have been scattered broadcast on the soil, this experiment does rather conclusively indicate that deep and thorough mixing of the fertilizers with the soil is a necessary procedure if the full benefit of the plant nutrients is to be obtained.

A series of greenhouse pot tests were also carried on in the winter after the field experiments discussed above were conducted. Twelve greenhouse pots were filled with thoroughly mixed sandy loam soil from Christmas Island, Nova Scotia. This soil was known to be quite unproductive in the fields until phosphorus was applied. The soil was quite acid, having a pH of 4.6. The per cent of phosphoric acid, according to laboratory analysis, was .105 and the phosphoric acid soluble in 1 per cent citric acid was .031.

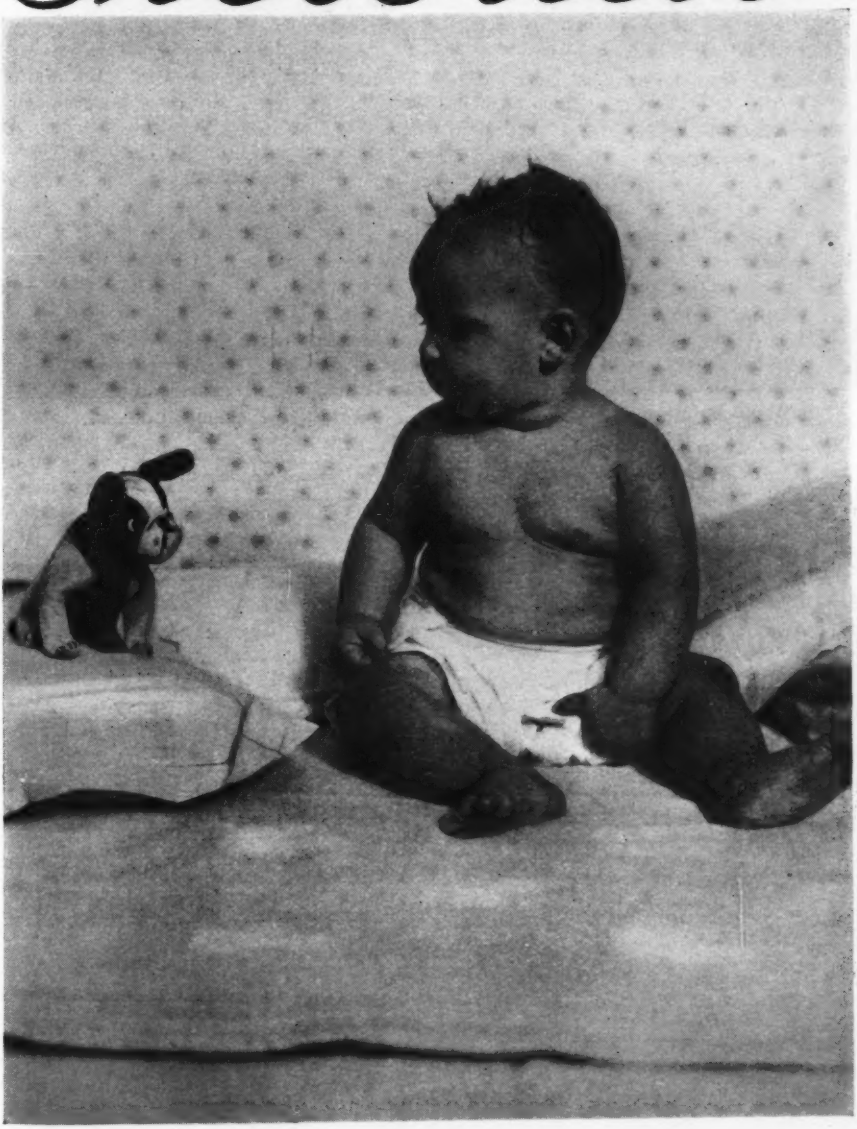
Spring wheat was planted in these

(*Turn to page* 51)

TABLE 1. Comparative Yields of Barley per Acre from Different Methods of Working in Fertilizers

| Method of working in fertilizers | 500 lbs. superphosphate | | | 150 lbs. muriate of potash | | | 125 lbs. ammonium sulphate 300 lbs. superphosphate 75 lbs. muriate of potash | | |
|---|---|---|---|---|---|---|---|---|---|
| | Treated bus. | Check bus. | Increase or decrease bus. | Treated bus. | Check bus. | Increase or decrease bus. | Treated bus. | Check bus. | Increase or decrease bus. |
| Plowed in | 33.0 | 29.7 | 3.3 | 36.3 | 29.7 | 6.6 | 40.1 | 29.7 | 10.4 |
| Disked in | 29.4 | 29.8 | —.4 | 35.5 | 29.8 | 5.7 | 34.9 | 29.8 | 5.1 |
| Harrowed in | 32.2 | 31.7 | .5 | 30.2 | 31.7 | —1.5 | 32.4 | 31.7 | .7 |

# Pictorial



GREETINGS!

**Above: Irrigating an orange grove on the Rosy Lee ranch near Anaheim, California.**

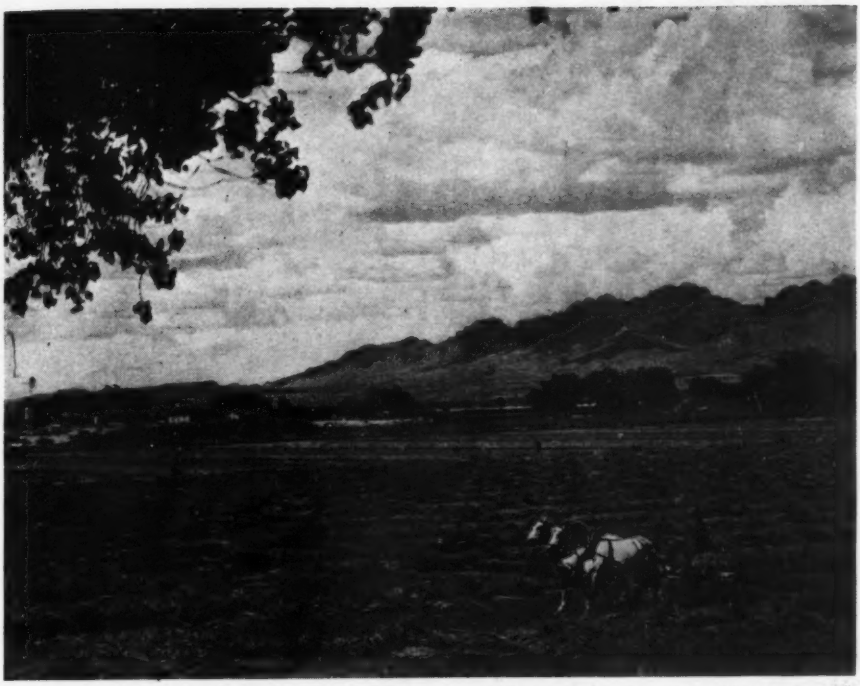
**Below: A street in Durant, Oklahoma, on Farmers' Market Day.**

**Above: Palms along an irrigation stream near Chandler, Arizona.**

**Below: Giant Cactus beside the Old Apache Trail near Roosevelt Dam, Arizona.**

**Above: The popular roadside market of W. D. Martin near Alvord, Texas.**

**Below: A large flock of turkeys on the Anderson Ranch, Gila Bend, Arizona.**



Above: Making alfalfa hay in the Rio Grande Valley, near La Mesa, New Mexico.

Below: Picking lima beans along the ocean at San Onofre, California.

Left: This electric pump furnishes water for the rice fields on the farm of C. D. Warner, Almyra, Arkansas.

Below: Near De Witt, Arkansas, this view of a dry rice field before being flooded with water shows the method of building levees in the field.

# The Editors Talk

## An Important Annual Report

Among other things that we are learning to do during this depression is *to face facts.* Therefore, we are able to read in the Annual Report for 1932 of the Secretary of Agriculture that there has been a greater shrinkage in farm commodity prices and in farm incomes than has occurred in the last 70 years in a calm spirit, but with a grim determination that somehow or other everybody will get together to improve the situation.

As pointed out in the report, the present situation again has demonstrated the old truth that it takes purchasing power as well as consumption to keep prices up. Consumption of the cheaper commodities has remained practically unchanged, but consumption of the more expensive commodities has declined. Prices of all commodities have fallen.

Agriculture has lost heavily on its capital account. The total value of all capital employed in agricultural production as of January 1, 1932, was $44,339,000,000 as compared with $58,249,000,000 on January 1, 1930. Two great burdens that press heavily upon the farmer today are mortgage debt and taxes. Interest and attendant costs on mortgage debt in 1930 represented a fixed annual charge of $568,000,000. While the charge itself remained about the same, the capacity to carry it has declined greatly in the last two years. Much the same applies to taxes on farm property. They have remained practically unchanged during the depression although in a few States farmers have received substantial relief. For the country as a whole, taxes in the last two years have been about 166 per cent higher than they were in 1914. Like the mortgage debt burden, their real weight has been doubled by falling prices since 1929.

As pointed out by the Secretary of Agriculture:

> "Simple justice requires both economy in public expenditure and drastic revision of the revenue system. Farm tax studies by the Department and by State institutions over a period of years point to the conclusion that the tax system discriminates against the farmer, and show that the injustice is greater now than it was five years ago. . . . Its recognition should form a basis for action. . . . Tax revision calls for substitutes for a substantial part of the general property tax levy."

Alternative taxes are suggested in the report.

Other important subjects in the report include land utilization, and the progress of agricultural research, which on several occasions has saved an entire branch of agriculture. For instance, a striking and recent example is the restoration of the sugar-cane industry in Louisiana. Many crops are reported as having been improved, particularly rice, wheat, tobacco, and lettuce. A promising new and non-competitive crop is the early-ripening strain of the Satsuma orange, which was introduced from Japan into the Gulf Coast region. The protection of corn from Japanese beetle, new control for the codling moth, engineering developments, and cutting dairy costs are other topics.

The report is a very instructive statement and analysis of the present situation as it affects our fundamental industry, agriculture. While it is an extremely difficult problem, there is little doubt that if his purchasing power is to increase, some help should be given the farmer who is trying to carry his mortgage debt and taxes at the old figures with the sadly reduced income.

## Soil Survey Demand Increases

Soil surveys are being used more and more, particularly in the West and South. State and federal soil scientists reported at a session of the annual meeting of the American Soil Survey Association held in Washington, November 15, that soil survey reports and maps are finding an increasing use by farmers, extension workers, land appraisers, and home-seekers.

A new type of soil survey, now issued by the United States Department of Agriculture, emphasizes the groupings of related soils and connects in a more understandable way the soil features with the agricultural opportunities. It has met with an enthusiastic response from farmers.

In summing up the value of the new type of soil survey report, Dr. Curtis F. Marbut, Chief of the Soil Survey of the Bureau of Chemistry and Soils said, "We find that the farmers, who are often as familiar with many of the practical phases of soil science as the surveyors themselves, are as much interested in the philosophy of things with which they are familiar as with the actual facts. In our present soil surveys we are giving them more of the why and wherefore of the agricultural relations of soils to agriculture with the same practical information which they have valued in the past."

The new type of soil survey report should be a great help, not only to extension workers, but to many farmers interested in organizing the most efficient cropping system for their farms.

## New Uses for Farm Crops

The world hears a great deal at present about production and especially over-production. It will be a welcome day, if it ever comes, when the world hears an equal emphasis on uses and over-uses.

Undoubtedly a major problem in the present national economy is to find a greater field of uses for farm crops. It is, therefore, encouraging to note that the Bureau of Chemistry and Soils of the United States Department of Agriculture is concentrating on finding a broader field of uses for the 15 most valuable farm crops. Recognizing the limits to human consumption of food, but seeing practically an unlimited field for farm products when they are converted into industrial materials, the Bureau is concentrating on the solution of the problem of new uses.

The 15 crops in order of their value are: corn, hay, cotton, wheat, oats, potatoes, tobacco, oranges, barley, apples, sugar beets, tomatoes, dry beans, grapefruit, and sweet potatoes.

As indicating the type of work the Bureau is doing in this field, it is studying corn from the point of view of industrial uses of by-products and the manufacture of starch, syrup, and oil. The hay crop is being studied to reduce the annual losses of $80,000,000 caused by spontaneous ignition, and spoilage from rain. The composition and uses of cottonseed and cotton products studies are in progress. Work with wheat straw for fiber production, the industrial uses of oat hulls and straw, the uses of surplus and cull potatoes for starch, the study of nicotine as an insecticide, new uses for cull and surplus oranges, uses for pomace and apple waste, uses for sugar beet residues, making tomato-seed oil, use of bean flour, and uses for cull and surplus grapefruit, are among some of the items included in the program.

This is a most important field of research and it is sincerely hoped that substantial progress will be made.

# Avocados Respond to Fertilizers

Fertilizer experiments on avocados conducted in California by E. E. Knight, a prominent grower, and reported in the *California Cultivator*, show that complete fertilizers are not only beneficial when properly used on avocados, but give better results than either nitrogen alone or any combination of two fertilizer elements.

Ninety large trees, 14 to 17 years old, were used in the experiment. Nine different fertilizer treatments were used, which included nitrogen, phosphate, and potash used alone and in various combinations including a complete fertilizer, that is, all three plant foods. As pointed out in the report, other good cultural practices must be followed. Fertilizers do not replace such cultural practices but have an important place in supplementing them in producing higher yields of better quality.

While only the third year of picking under experimental conditions is reported, some points of practical interest are already indicated:

1. Phosphate and potash broadcast give much poorer results than when applied in holes 10 to 12 inches deep extending two feet apart around the drip of the tree. In fact, little or no result is obtained from broadcast applications. This is attributed to the fact that phosphate and potash may be fixed in the soil.
2. Nitrogen is essential to best growth and fruiting, but because of signs of tree injury, applications of nitrogen alone are being discontinued.
3. The complete fertilizer, nitrogen, phosphate, and potash, gives by far the best crop. The fruit also is first class as to quality and shipping. In obtaining the best results with complete fertilizers, some dairy manure was also used.
4. Potash appears to be the protecting factor in reducing tree injury caused by winter frosts.

Full details as to amounts and kinds of fertilizers used are given in the article. In the words of E. E. Knight the results to date seem to warrant the following conclusions.

> "Nitrogen within certain limits improves the appearance of the fruit and does not detract from its flavor and eating quality, also gives the necessary wood growth. In excess it reduces shipping qualities of the

fruit, and promotes excessive wood growth which is undesirable as it increases its succulence, making it harder to pick the fruit and the trees more liable to wind damage. Carried to extreme it reduces the crop and may cause die-back at the end of the branches, as sometimes happens when trees are planted in an old corral, or where loads of manure have remained on the ground for a long time.

"Phosphoric acid vitalizes the bloom, thus promoting a heavy set of fruit. It builds up the seed in the fruit, and increases the fibre roots. (Proved by our previous experiments with avocados grown from seeds in glass jars.)

"Potash gives shipping qualities to the fruit, broadens and flattens the leaves, rounds out the new wood growth and hardens the trees against frost damage."

As reported, this work is to be continued. While specifically of value on avocados, it would seem that some valuable principles on the use of fertilizers on orchard fruits may be demonstrated as the work is continued for a few more years.

## An Important Birthday

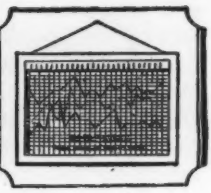
The American Society of Agronomy is 25 years of age this year. The 25th annual meeting was held at the Willard Hotel, Washington, D. C., November 17 and 18. A special anniversary program was given with President P. E. Brown presiding on Thursday afternoon, November 17.

Three national figures in the agronomic world outlined the progress of the Society and the developments in soil and plant science. Dr. T. L. Lyon of Cornell University, Historian of the Society, was the first speaker on the history of the organization of the Society. In a very interesting manner, Dr. Lyon traced the growth from the first meeting 25 years ago which was held at the Shoreham Hotel in Washington to the present. Many of the members whose photographs were taken at that time in the group attending the meeting were present at the 25th anniversary.

"A Quarter Century of Development in Soil Science" was very ably discussed by Director J. G. Lipman of the New Jersey Agricultural Experiment Station. Following this paper, Dr. C. W. Warburton of the United States Department of Agriculture presented "A Quarter Century of Progress in the Development of Plant Science." The speaker reviewed some of the outstanding accomplishments of the last quarter of a century in plant science, as did Dr. Lipman in soil science.

This anniversary meeting of the Society served to emphasize many things, among them the loyalty of the workers in the agronomic field, not only to their Society, but to the progress of soil and plant sciences in making definite contributions to our agricultural well-being. It emphasized the importance of these sciences as one of the broad bases on which human welfare rests. The history of the last quarter of a century seen in perspective served to demonstrate beyond any doubt that fundamental progress is being made in this field of work. In the course of years the Society has grown enormously in numbers and has broadened its field of activities. In the next 25 years may the American Society of Agronomy continue to make the loyal and sound progress that it has made in the last quarter of a century.

# AGRICULTURAL DEVELOPMENTS



## SOIL SURVEY MAPS PROTECT PURCHASERS OF FARM LAND

"Even experienced farmers make mistakes in judging the value of soils," says W. E. Tharp of the soil survey division of the United States Department of Agriculture. While making a recent soil survey in the Middle West, Tharp was questioned by a landowner who doubted the value of such work.

Knowing the soils in that locality to be heavy silty clay loams, Tharp asked the farmer why he had chosen that particular type. "I did not choose it," replied the farmer, "this location, the improvements, and the price were satisfactory, and I just supposed the soil to be about the same as that I had farmed for years in an adjoining county. The soils look much alike, and the same kind of crops are grown. But I have since found that this land can not be plowed if dry, and must not be cultivated when wet; that the hillsides wash pretty badly, and clover does not do so well as on the lighter soils. This farm if well managed produces good crops, but this is not the kind of land I thought I was buying."

In this instance, Tharp points out, a slight difference in soil texture was overlooked by an experienced farmer. The consequences have not proved disastrous, but have necessitated a radical change in methods of tillage, with a considerable permanent increase in labor costs per acre.

Before their discussion ended, Tharp says the farmer was convinced that in the selection of a farm home a soil map is almost indispensable, particularly in a locality with which the purchaser is not familiar. A soil survey not only shows where the different kinds of soil occur, but it explains the causes of these differences, indicates tillage requirements, discloses fertilizer needs, and gives the crop adaptations.

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## AIR-CONDITIONED LABORATORY

To control air conditions in its study of fertilizer-distributing machinery the Bureau of Agricultural Engineering has just completed the construction of a laboratory equipped with air-conditioning machinery for automatic control of temperature and relative humidity. The laboratory is on the United States Department of Agriculture Experiment Farm, in Arlington county, Va.

In the laboratory humidity can be regulated at various temperatures within the range of field conditions. The building also provides space for operating machines over a soil track for accurate study of machine performance and of the action of soil-working tools, including fertilizer placement devices.

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## ASIATIC MUSKMELONS SAVE CALIFORNIA CROP

Another plant disease has been checked and an apparently worthless muskmelon from far-off India has revived the hopes of muskmelon growers in the Imperial Valley in California.

Although the fruit from the Far East tasted bad, had little sweetness, and was not adapted for shipping, it had one redeeming feature; it was unaffected by powdery mildew, the dis-

ease which threatened the whole Imperial Valley muskmelon industry.

Plant breeders of the United States Department of Agriculture and the University of California discovered the Indian plant in 1928 in a world-wide search for disease-resistant varieties. By crossing it with one of the leading varieties grown in the valley the breeders got two strains which were tested commercially for the first time this year and which promise to resist the melon disease successfully. The new varieties should be commercially available by 1933.

## NEW JERSEY ORGANIZES FOR ECONOMIC ADVANCEMENT

New Jersey agriculturists, business men and rural bankers met at Trenton on November 18 and formed an association for the economic advancement of New Jersey's agricultural industry.

The association was created for the purpose of meeting farm credit problems before they reach emergency stages, and to consider the State's position in regard to national agricultural policies. Its program may include projects for the development of New Jersey agricultural resources dealing with efficient land utilization, the tax burden on farm real estate, and governmental economies.—*U. S. D. A. Marketing Activities.*

## FARM WASTES OF MANY STATES TESTED IN IOWA

Waste farm products from States as far apart as Minnesota and Texas, South Dakota, and Alabama have been sent to the farm-waste laboratory of the United States Department of Agriculture maintained cooperatively with the Iowa State College at Ames, Iowa, to find profitable uses for such products.

In the last year distillation experiments were made with ground corncobs, chopped cornstalks, barley straw, oat hulls, whole corncobs, elevator screenings, and furfural residues from Iowa; wheat straw from Minnesota; cottonseed hulls, peanut shells, and pecan shells from Texas; rice hulls from Arkansas; flax straw from South Dakota; and cottonseed-hull bran from Alabama.

Finding commercial and industrial uses for farm wastes is a stubborn problem for the scientists at the laboratory, but they are making exhaustive tests with many different wastes. They know that such products as cornstalks and straw contain material useful for fiber, building board, and similar uses, but it remains for them to determine sufficiently cheap methods of making these products. They have produced a fuel gas from certain wastes. A puzzling substance found in all farm wastes is lignin. Many experiments have been made with lignin, but its exact composition remains unknown.

## PEANUT VALUABLE AS FOOD

The goober peanut, relative of the common pea, has outgrown its circus days, it now being grown commercially for its food value in South America, Africa, India, Manchuria, and the United States, said Miss Jean Stewart, Bureau of Home Economics, in a recent radio talk on the place it has assumed in the human diet. "The peanut had no commercial value in the United States until after the Civil War," she said. "During the war the soldiers discovered its sustaining power as food. Last year more than 2,000,000 acres were planted to peanuts and more than 1,000,000,000 pounds were gathered—and found use as fresh roasted peanuts, salted peanuts, peanut butter, and peanut oil. Peanuts have exceptional food value. They run high in protein, fat, and vitamin B. A pound of peanuts contains nearly half a pound of fat and nearly a fourth of a pound of protein. Both the fat and protein in peanuts are easy to digest."—*The Official Record.*

# Potash Is Necessary *for* Grapes

GRAPES respond well to potash fertilization and exhibit very definite signs of malnutrition where potash is markedly deficient, according to work by Lagatu and Maume of France.

In their experiments, the authors also found that the leaves at the base of the bearing shoots of a well-fertilized, healthy, and productive vine had a potash content equal to or above the average contents of nitrogen and phosphoric acid together. They worked with the Aramon variety, grafted on Rupestris stocks, and state this high potash content is characteristic of a proper fertilization for this variety.

An experiment was laid out with five plots, with treatments as given below. The yields are expressed as gallons of juice per acre.

| Treatments | Yield: Gallons of Juice per Acre 1930 | 1931 |
|---|---|---|
| Unfertilized | 829 | 757 |
| 90 lbs. N<br>90 " $P_2O_5$ | 829 | 882 |
| 90 lbs. N<br>90 " $P_2O_5$<br>180 " $K_2O$<br>(108 lbs. in 1929) | 1,356 | 1,283 |
| Guano<br>267 lbs. $K_2O$ | 1,292 | 927 |
| Guano<br>534 lbs. $K_2O$ | 1,177 | 1,211 |

N from nitrate of soda, $P_2O_5$ from basic slag, $K_2O$ from muriate of potash.

On this heavy calcareous soil, unless the fertilizer contained potash, it had relatively little effect. The authors state that the potash content in the leaves of the unfertilized plot was low the first year of this experiment (1929), and in the following years was below even the phosphoric acid content. Potash deficiency signs were very strong on this plot.

The nitrogen-phosphoric acid plot yielded little better than the unfertilized plot and also showed the characteristic signs of potash hunger (Fig. 1 on the next page is taken from this plot). The potash deficiency symptoms are described as: first, the leaves becoming brown (observed all years); second, stunted shoots; third, yellowing of the leaves from the beginning of July, very noticeable and increasing as the season advances (observed in 1931); fourth, restricted development and incomplete maturation of the grapes. The vitality of the stock was lowered.

The third plot above showed little benefit from the 108-pound potash application in 1929, the first year. The beneficial effect gradually increased the following two years, with a higher potash application. There were a number of leaves on this plot that became moderately brown (Fig. 3 was taken from this plot). No yellowing of the leaves was observed in 1931.

The 267-pound potash application with guano was noticeably beneficial the first year and each following year. However, the authors state this amount was not entirely sufficient. Only occasional leaves showed a slight browning and there was no yellowing in 1931. The shoots and grapes were moderately well developed.

The highest or 534-pound potash application was noticeable in 1929, but it was not until 1930 that the optimum equilibrium was established.

FIG. 1—ACUTE POTASH HUNGER
The leaves are very brown; the shoots stunted; and there is a poor development of grapes.

There were no pathological symptoms on this plot. The leaves were large, dark green, and without any traces of browning or yellowing. The shoots were long and strong; and the grapes were large, sound, and well matured at harvest time (Fig. 2 was from this plot).

The authors point out that this soil,

FIG. 2—NO POTASH HUNGER
There are no brown spots; and there is a good, healthy development of grapes and shoots.

exhausted of its potash, was sufficiently restocked with potash for optimum plant nutrition only after three annual applications of 534 pounds per acre of actual potash. Smaller applications of potash did not fully saturate the absorptive capacity of the soil within the same time. They also emphasize

(*Turn to page* 58)

FIG. 3—MEDIUM POTASH HUNGER
The brown spots on the leaves are moderate; the development of grapes and shoots, medium.

# REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, and Crops. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

## Fertilizers

The course of plant-food consumption in various States as brought out in the reports of fertilizer analyses by the State chemists shows some very interesting and significant trends. Unfortunately, some of the reports issued do not summarize the results in such a way as to show the amount of plant food in the fertilizers consumed in the State. Indiana, however, does summarize these results very completely and the table on plant-food consumption shows how the usage of fertilizers is changing as time goes on and with increased knowledge of plant nutrition. For lack of space we are quoting here only the tons of nitrogen, phosphoric acid, and potash consumed in fertilizers in Indiana in 1921 and 1931 from Circular 190 of the Purdue Agricultural Experiment Station by H. R. Kraybill, O. S. Roberts, O. W. Ford, L. E. Horat, and M. H. Thornton.

| | N | $P_2O_5$ | $K_2O$ |
|---|---|---|---|
| 1921 | 1,640 | 21,657 | 4,559 |
| 1931 | 4,076 | 22,231 | 12,201 |

It will be seen that the consumption of nitrogen and potash has increased rapidly, while the consumption of phosphoric acid has been almost stationary. Nitrogen consumption increased 2.48 times in the last 10 years, while potash increased 2.67 times. Of course, these changes in plant-food consumption were not regular, variations occurring from year to year with a falling-off in the last one or two years due to unfavorable agricultural conditions.

Similar data over a shorter period of time are found in "1932 Fertilizer Analyses and Registrations," by H. A. Halvorson, issued by the Department of Agriculture of Minnesota. The data cover the period only from 1929 to 1932 and are summarized below:

| | N | $P_2O_5$ | $K_2O$ |
|---|---|---|---|
| 1929 | 225 | 2,512 | 746 |
| 1932 | 223 | 1,220 | 1,163 |

Much smaller quantities of plant food are consumed in Minnesota than Indiana, owing to agriculture being somewhat younger in this State and to the different types of farming practiced. It will be seen that the nitrogen has been almost stationary, phosphoric acid has fallen off, and potash has increased. Here again, the consumption of plant food in the last year has been below previous years owing to the unfavorable agricultural situation.

Similar trends in fertilizer consumption have been noted in other States from time to time and they show how the practice of plant feeding is changing, especially in the newer fertilizer-consuming States in the Midwest.

*"Commercial Fertilizers—Agricultural Minerals, 1931," Dept. of Agr., Sacramento, Cal. Spec. Pub.* 111, *John W. Elmore.*

*"Fertilizer Suggestions for Idaho Farmers," Univ. of Idaho, Moscow, Idaho, Ext. Bul.* 88, *May,* 1932, *G. R. McDole.*

*"Commercial Fertilizers, Commercial Feeds and Agricultural Liming Materials," Univ. of Md., Col. Park, Md., Control Series, No.* 144, *Aug.,* 1932.

*"Inspection and Analysis of Commercial Fertilizers, Spring, 1932," Agr. Exp. Sta., Columbia, Mo., Bul. 318, Oct., 1932, F. B. Mumford and L. D. Haigh.*

*"New Jersey Prices of Hired Farm Labor, Feedstuffs and Fertilizer Materials and Their Index Numbers, 1910-1930," Dept. of Agr., Trenton, N. J., Cir. 199, May, 1931, D. T. Pitt and C. J. Grant.*

*"Official Report on Feed Stuffs, Commercial Fertilizers, and Agricultural Lime and Limestones," Dept. of Agr., Columbus, Ohio, 1931.*

*"Substituting Fertilizers, Green Manure, and Peat for Stable Manure in the Growing of Vegetables," Agr. Exp. Sta., Kingston, R. I., Bul. 234, Aug., 1932, F. K. Crandall and T. E. Odland.*

*"Relative Efficiency of Various Organic Supplements in the Growth of Greenhouse Tomatoes," Agr. Exp. Sta., Kingston, R. I., Bul. 236, Aug., 1932, B. E. Gilbert and F. R. Pember.*

*"Experiments with Lime, Fertilizers, and Varieties of Field Crops in the Cotton and Peanut Section of Virginia," Agr. Exp. Sta., Blacksburg, Va., Bul. 284, May, 1932, E. T. Batten and T. B. Hutcheson.*

## Soils

*"Studies on Iron, Aluminum, and Organic Phosphate and Phosphate Fixation in Calcareous Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 40, June 15, 1932, W. T. McGeorge and J. F. Breazeale.*

*"Nutritional Disorders in Alkaline Soils as Caused by Deficiency of Carbon Dioxide," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 41, June 22, 1932, J. F. Breazeale and W. T. McGeorge.*

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*"Soil Survey of Iowa—Union County," Agr. Exp. Sta., Ames, Iowa, Soil Survey Rep. 68, June, 1932, P. E. Brown, J. A. Elwell, H. R. Meldrum, and A. J. Englehorn.*

*"Pump Irrigation and Water Table Studies," Exp. Sta., Lincoln, Neb., Bul. 271, May, 1932, Harry E. Weakly.*

*"The 'Red Hill' Soils of Western Oregon and Their Utilization," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 303, June, 1932, C. V. Ruzek and W. L. Powers.*

## Crops

To commemorate 50 years of service to agriculture, the New York State Agricultural Experiment Station at Geneva, New York, has issued Circular No. 136, "Facts About the Geneva Station." The publication, in brief and well-arranged groupings, modestly describes the outstanding accomplishments and purposes in agricultural research of this experiment station which enjoys national and international esteem for its important contributions.

"The Station does not attempt to run a 'model' farm, nor does it necessarily demonstrate good farm management in its fields and orchards. Rather these are used as outdoor laboratories for carrying on experiments under more nearly natural conditions. In all of its work the Station is attempting to establish facts and principles that shall serve as safe guides in farm practice. Other agencies in the State take the facts developed in the Station researches and show how they can be applied on the farm."

Too many to mention here are the valuable and far-reaching services of the Geneva Station. Possession of the publication will provide a handy index and reference.

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*"Strawberry Culture in Connecticut," Agr. Col., Storrs, Conn., Ext. Bul. 167, Apr., 1932, H. A. Rollins.*

*"Report of the Director for the Year Ending June 30, 1931," Agr. Col., Storrs, Conn., Bul. 176, Mar., 1932, Wm. L. Slate.*

*"Studies on Summer Cover Crops in a Pineapple Orange Grove," Agr. Exp. Sta., Gainesville, Fla., Bul. 253, Oct., 1932, W. E. Stokes, R. M. Barnette, H. W. Jones, J. H. Jeffries.*

*"Vegetable Gardening," State Col. of Agr., Athens Ga., Ext. Bul. 358 (Rev.), June, 1932, R. L. Keener.*

*"Managing the Farm Woods for Profit," Agr. Exp. Sta., Urbana, Ill., Cir.* 392, *May,* 1932, *L. E. Sawyer.*

*"Report of Moses Fell Annex Farm, Bedford, Indiana," Agr. Exp. Sta., Lafayette, Ind., Cir.* 191, *June,* 1932, *H. J. Reed and H. G. Hall.*

*"Planting and Care of Shade Trees," Agr. Exp. Sta., Lafayette, Ind., Ext. Bul.* 119 (2*d Rev. Ed.*), *May,* 1932, *C. L. Burkholder.*

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*"Lessons on Farm Crops," Col. of Agr., Lexington, Ky., Ext. Cir.* 56, (5*th Ed. Rev.*), *Jan.,* 1932, *E. J. Kinney.*

*"Potato Project Junior 4-H Clubs," Col. of Agr. Lexington, Ky., Ext. Cir.* 100 (*Rev.*), *Apr.,* 1932, *John S. Gardner.*

*"Orcharding," Col. of Agr., Lexington, Ky., Ext. Cir.* 118 (4*th Ed. Rev.*), *Feb.,* 1932, *A. J. Olney and W. W. Magill.*

*"Potato Growing in Kentucky," Col. of Agr., Lexington, Ky., Ext. Cir.* 202 (*Rev.*), *Feb.,* 1932, *John S. Gardner.*

*"Annual Report for the Year Ended December* 31, 1931," *Col. of Agr., Lexington, Ky., Ext., Cir.* 259, *T. R. Bryant.*

*"Seventieth Annual Report of the Secretary of the State Board of Agriculture of the State of Michigan and Forty-fourth Annual Report of the Experiment Station from July* 1, 1930 *to June* 30, 1931," *East Lansing, Mich.*

*"American Potato Journal," Potato Assn. of America, East Lansing, Mich., Vol. IX, No.* 11, *Nov.,* 1932.

*"Modern Strawberry Growing," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Spec. Bul.* 72, (*Rev.*), *Apr.,* 1932, *Franc P. Daniels.*

*"Drying of Legume Hay Plants," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Tech. Bul.* 83, *Apr.,* 1932, *Floyd Linville Higgins.*

*"Report of the Raymond Branch Experiment Station," Agr. Exp. Sta., State Col., Miss., Bul.* 299, *Dec.,* 1931, *H. F. Wallace.*

*"Development and Care of Lawns," Univ. of Mo., Columbia, Mo., Ext. Cir.* 274, *July,* 1931, *Horace F. Major.*

*"Autumnal Migration of Nitrogen and Carbohydrates in the Apple Tree," Agr. Exp. Sta., Columbia, Mo., Res. Bul.* 171, *July,* 1932, *A. E. Burneek and J. C. Logan.*

*"Cereal Variety Experiments at North Platte," Exp. Sta., Lincoln, Neb., Bul.* 272, *June,* 1932, *N. E. Jodon.*

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*"Pollination of Fruit Trees," Agr. Exp. Sta., Geneva, N. Y., Cir.* 132, *Mar.* 15, 1932, *Richard Wellington.*

*"Peach Growing," Agr. Exp. Sta., Geneva, N. Y., Cir.* 133 (*Rep.*), *Oct.* 1, 1932, *Olav Einset.*

*"The Plum in New York," Agr. Exp. Sta., Geneva, N. Y., Cir.* 134 (*Rep.*), *Oct.* 1, 1932, *L. M. Van Alstyne.*

*"Beans for New York," Agr. Exp. Sta., Geneva, N. Y.. Cir.* 135, *June* 1, 1932, *W. T. Tapley and W. D. Enzie.*

*"The Gladiolus," N. Y. State Col. of Agr., Cornell Univ., Ithaca, N. Y., Ext. Bul.* 231, *Apr.,* 1932, *Alfred M. S. Pridham.*

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*"Fifth-fourth Annual Report of the North Carolina Agricultural Experiment Station," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Dec.* 1. 1931, *R. Y. Winters.*

*"Effect of Weathering and Stage of Maturity on the Palatability and Nutritive Value of Prairie Hay," Agr. Exp. Sta., Fargo, N. D., Tech. Bul.* 260, *July,* 1932, *F. W. Christensen and T. H. Hopper.*

*"Flowering Bulbs," Ohio State Univ., Columbus, Ohio, Ext. Bul.* 120, *June,* 1931, *Victor H. Ries.*

*"Perennial Flowers," Ohio State Univ., Columbus, Ohio, Ext. Bul.* 121, *Apr.,* 1931, *Victor H. Ries.*

*"Lawns," Ohio State Univ., Columbus, Ohio, Ext. Bul.* 129, *Mar.,* 1932, *George M. McClure, C. J. Willard, and F. A. Welton.*

*"Apple Thinning, With Special Reference to Grimes Golden and Jonathan," Agr. Exp. Sta., Wooster, Ohio, Bul.* 508, *Sept.,* 1932, *C. W. Ellenwood and F. S. Howlett.*

*"Grafting and Budding Fruit Trees," Agr. Exp. Sta., Wooster, Ohio, Bul.* 510, *Sept.,* 1932, *I. P. Lewis.*

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*"Crop Yields and Financial Returns in a* 5*-Year Rotation of Crops," Agr. Exp. Sta., Kingston, R. I., Bul.* 235, *Aug.,* 1932, *T. E. Odland and S. C. Damon.*

*"Variations in Amounts of Carbohydrates in the Leaves of Corn," Agr. Exp. Sta., Brookings, S. D., Bul.* 270, *Mar.,* 1932, *Leo F. Puhr and A. N. Hume.*

*"The McClintock Strawberry," Agr. Exp. Sta., Knoxville, Tenn., Bul.* 146, *Sept.,* 1932, *Brooks D. Drain.*

*"Grain Sorghum Varieties in Texas," Agr. Exp. Sta., Col. Sta., Tex., Bul.* 459, *Sept.,* 1932, *R. E. Karper, J. R. Quinby, D. L. Jones, and R. E. Dickson.*

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*"Report of the Acting Chief of the Office of Experiment Stations," U. S. Dept. of Agr., Washington, D. C., June 30, 1931.*

## Economics

The very name of Mississippi's Bulletin No. 298, "Making Cotton Cheaper — Can Present Production Costs Be Reduced?" will create interest wide in its range. Reporting the investigations of M. G. Vaiden, J. O. Smith, and W. E. Ayres at the Delta Experiment Station, Stoneville, Mississippi, the publication presents pertinent information on a vital problem in agriculture of the South.

The new bulletin is a supplement to Mississippi Bulletin 290, and the authors state that the cotton production cost records presented should be studied along with those in Bulletin 290. They found production costs materially reduced in 1931, but still relatively too high on the average to permit profits. Further reductions will be made in 1932, but there is a minimum below which reduction is not possible.

Among the statements incorporated in the summary are the following

"Labor costs are more variable than other items. For this reason costs on plantations using small units of equipment and excessive amounts of labor are much more variable than where maximum use is made of machinery and labor requirements reduced to a minimum.

"Putting labor on a cash or day basis will increase its efficiency 50 to 100%.

"As cultivating machinery is improved, more hoeing can be eliminated by cross plowing. Cotton chopping machines will also assist. Soil enrichment will make checked (either check-planted or plowed into checks) cotton compete in production with drilled cotton, thereby eliminating more hoeing.

"The South will not retrograde. Machine production will be rapidly increased in cotton growing as it has in the industries. Planters should accelerate their present evolution in the direction of labor replacement by practical, economical farm machines now available."

*"Economic Trends in the Lettuce Industry," Univ. of Ariz., Tucson, Ariz., Ext. Cir. 73, Aug., 1932, J. M. Foote.*

*"An Economic Study of 249 Dairy Farms in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 246, May, 1932, Bruce McKinley.*

*"Planning the Farm Business for the Year Ahead," Agr. Exp. Sta., Moscow, Idaho, Bul. 188, June, 1932, Paul A. Eke and Ezra T. Benson.*

*"Why Corn Costs Vary," Agr. Exp. Sta., Ames, Iowa, Bul. 289a (Abridged), June, 1932, H. L. Thomas and John A. Hopkins, Jr.*

*"Planning Systems of Farming for the Red River Valley of Minnesota," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Bul. 284, Sept., 1931, George A. Pond, George A. Sallee, and C. W. Crickman.*

*"Farm Planning for Increased Efficiency and Better Incomes on Mississippi Farms," Agr. Exp. Sta., State Col., Miss., Ext. Bul. 64, July, 1932, T. L. Gaston.*

*"Farm Profits and Factors Influencing Farm Profits on 98 Dairy Farms in Sussex County," Agr. Exp. Sta., New Brunswick, N. J., Bul. 542, May, 1932, Allen G. Waller and Emil Rauchenstein.*

*"Production and Marketing of Field Beans in New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 532, Dec., 1931, H. N. Young.*

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*"The Taxation of Farmers in South Carolina," Agr. Exp. Sta., Clemson Col., S. C., Bul. 285, Oct., 1932, G. H. Aull.*

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*"An Economic Study of Farm Organization in the Piney Woods Farming Area of Texas," Agr. Exp. Sta., Col. Sta., Tex., Bul. 453, Sept., 1932, C. A. Bonnen, B. H. Thibodeau, and J. F. Criswell.*

*"Marketing Virginia Tobacco," Agr. Exp. Sta., Blacksburg, Va., Bul. 285, May, 1932, Roy A. Ballinger and J. L. Maxton.*

*"An Economic Study of Cooperative Buying and Selling Among Farmers in Virginia," Agr. Exp. Sta., Blacksburg, Va., Bul. 286, June, 1932, Ransom C. Talbot.*

*"Cooperative Marketing Makes Steady Growth," Federal Farm Board, Washington, D. C., Bul. 8, Apr., 1932.*

*"Statistics of Farmers' Selling and Buying Associations, United States, 1863-1931," Federal Farm Board, Bul. 9, June, 1932.*

*"Cooperative Marketing of Farm Products," Federal Farm Board, Washington, D. C., Bul. 10, June, 1932.*

# "Fertilizers *and* Crop Production"

A STANDARD book on fertilizers for many years has been Dr. L. L. Van Slyke's "Fertilizers and Crops." The many users of this book will be glad to learn that the long-awaited revision of it has just appeared under the title of "Fertilizers and Crop Production." (Orange Judd Publishing Co., Inc., New York, $4.00). The general form and arrangement of the old edition has been retained in the new one. The subject matter has been brought up to date, especially in the section dealing with fertilizer materials. A discussion of fertilizer ratios also has been introduced in an appropriate place.

The book is divided into five parts for convenience in handling the subject matter. Part one is more or less introductory and gives a general discussion of the factors of soil fertility, chemical composition of plants, and the common compounds in which plant nutrients are found. A very important chapter in this section gives the influence of the plant constituents on plant growth, and another chapter gives the elements of chemistry necessary in the understanding of a discussion of fertilizers.

The next section of the book considers the soil from the fertility viewpoint with most attention properly being given to soil moisture and organic matter and related subjects. The third section is mainly taken up with a description of the commercial fertilizer materials carrying nitrogen, phosphoric acid, and potash. Brief notes on the composition, preparation, properties, and use of these materials are given. A chapter on lime compounds and their use is also included. The latter part of this section treats the subject of farm and green manure.

The fourth section considers the factors that should be considered in selecting the fertilizers to use. Much useful information on cost of fertilizers, commercial fertilizers, and home-mixing is included. The last section discusses the practical use of fertilizers on crops, a separate chapter being devoted to each group of crops. The general principles given by the author here are very good, but a word of caution should be given against applying too literally the recommendations of fertilizer analyses for the individual crops. As Dr. Van Slyke points out on page 349:

"No particular analysis or mixture of plant foods can be prescribed for any one crop under all conditions or for every crop on a given soil. In the very nature of the case the question of quantities and proportions of plant foods to be used must always remain more or less a matter of individual experience and observation. Moreover, it must be remembered that one's practice cannot remain continuously the same. The soil of each field is undergoing constant change in the extent and character of its needs."

A very noteworthy feature of this section of the book is the table of plant food removed by crops given at the end of each chapter. The reader can thus gain an idea as to the amounts of plant food each crop is removing from the soil, a very important fact, since it is evident that eventually the plant food applied to the soil will tend to approach these figures. The chapter on fruit crops should be read by all fruit growers for the many excellent facts on fruit fertilization.

"Fertilizers and Crop Production" thus covers very thoroughly the field that its title indicates. Its completeness and thoroughness make it wellnigh indispensable to those concerned with the investigation and recommendation of fertilizers; while its clear, concise, and easily understandable explanations recommend it to the practical farmer. It has a broad appeal as a reference and textbook.

Dr. Van Slyke's long and varied activities in the field of agricultural chemistry made him well fitted for the task of preparing such a book. Finished just before his death, it is a worthy and fitting crown to his industrious and fruitful life in the agricultural field.

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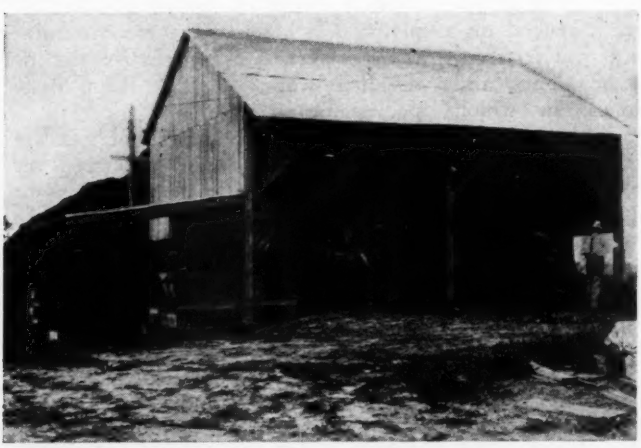
# More and Better Lima Beans

(*From page* 24)

Analyzing the above results, it is apparent that an increase in organic nitrogen content resulted in increased yields and that although an increase in phosphorus produced somewhat larger yields, the most pronounced increase was from the plots having the higher potash.

The results of these tests and their reaction on growers and canners may be summed up in the following quotations taken from an address delivered by Mr. R. O. Dulany of the Dulany Packing Co. before the Peninsula Horticultural Society in December, 1931. In discussing "The Production of Lima Beans for Canning," Mr. Dulany said:

"We have used a 5-8-5 fertilizer for years. Tests carefully conducted this year (1931), gave us three very clear indications. The first was that fertilizer with 75 per cent of organic nitrogen (ammonia) gave better results, that is, larger yields, than fertilizer with only 25 per cent; second, a 5-12-5 fertilizer gave a yield 10 per cent higher than a 5-8-5 mixture; while the third was that a 5-8-12 fertilizer gave a yield more than 20 per cent higher than the 5-12-5 and more than 30 per cent higher than the 5-8-5 mixture."



**At the viner the pods are cracked, allowing the lima beans to flow into flat boxes.**

# Depth of Application of Fertilizer

(*From page* 30)

pots in the most approved manner. Each pot, except the controls, was treated with triple superphosphate (48%) at the rate of 166 pounds per acre. For three of the pots the superphosphate was scattered on the surface of the soil after the seed was sown. Three and one-half inches of soil was removed from each of three other pots, the superphosphate scattered on, the soil replaced, and the seed sown. For three other pots the seed was mixed with the superphosphate, the soil taken out to a depth of 1¾ inches, the seed and fertilizer scattered on, and the soil replaced. The three other pots received no fertilizer treatment. The pots were harvested on May 1 when the kernels had reached the dough stage of maturity.

The increase in dry-matter yield of the whole wheat plant from surface application of triple superphosphate, as compared with the yield where no fertilizer was applied, was negligible, but where the fertilizer had been applied in the soil to depths of 1¾ and 3½ inches the increase in dry matter over the untreated pots was approximately 270 per cent.

While pot tests are not always a reliable index of what will happen in the field, they are nevertheless often quite useful in fertilizer trials.

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# Potash Makes Quality Peas

(*From page* 17)

and easily made, and the results correlate well with the quality of the canned peas. The chemical tests, while quite reliable, are expensive and time-consuming.

Among the practical applications from this work are the following:

1.—Potassium in peas does not increase toughness, but on the contrary is associated with tenderness. It should be adequately supplied to the growing plant.

2.—Potassium and calcium are present in an inverse ratio. Any practice which favors potassium in the plant tends to reduce calcium and vice versa.

3.—Calcium in the pea increased its toughness, therefore, practices and fertilization resulting in an increased potassium and decreased calcium content in peas will improve their quality.

4.—As peas ripen, calcium migrates to the seed coat, making it tougher. It is, therefore, important to harvest the crop as early as possible, consistent with obtaining good yield.

5.—The mechanical tests of skin puncture and crushing forces are good indices of the quality of peas for canning.

6.—After shelling, calcium migrates into and potassium out of the seed coat, resulting in increased toughness. Therefore, peas should be canned as soon as possible after being shelled.

In the conclusions of the authors, the following statement is made:

"With a soil and climate generally suited to peas, the grower can fertilize for quantity, and the quality will take care of itself. However, from the standpoint of quality, it would be a

safe precaution to have abundant available potassium present, as this would tend to lessen the absorption of calcium. No difference could be detected between the chloride and the sulfate in potassium fertilizers in their effect on quality of peas . . . These conclusions are based on the assumption that the peas are harvested at the proper stage, since peas under any condition of growth will become tough if their field life is unduly prolonged."

Sayre, C. B., Willaman, J. J., and Kertesz, Z. I. Factors Affecting the Quality of Commercial Canning Peas. *New York State Agricultural Experiment Station (Geneva) Technical Bulletin* 176. *March*, 1931.

Sayre, C. B., Nebel, B. R. Some Effects of Different Nutrient Solutions on the Structure, Composition, and Quality of Peas. *Proceedings of the American Society For Horticultural Science*, 1930, *Page* 221.

# Gold Medal Sweets

(*From page* 27)

announced, and another group of cooperators lined up for the 1931 contest. Acting on the results of the past year's experiences, these growers switched from the 2-12-6 and 2-16-8 fertilizers to 2-10-10, 0-10-20, 2-8-16, and 3-9-18. The results obtained were comparable to those found in other sweet potato sections—higher potash fertilizers gave better results.

For the 1931 season in Indiana, eleven growers made an average of 363.18 bushels. Ten of the eleven were gold medal winners. The highest yield was obtained by manuring the field and an April application of 175 pounds of 0-8-32, followed by a side-dressing of 750 pounds of 3-9-18 about the first of June. This yield was well over 500 bushels per acre. Of the ten remaining growers, three used 2-10-10; five used 2-8-16 or 3-9-18; and two used 2-16-8. These plots also were supplemented with manure.

As a matter of comparison, other analyses were tried out by some of these same growers. An average of 750 pounds of 2-12-6 gave 132.5 bushels of No. 1 grade and 65 bushels of No. 2's, while 658 pounds of 2-16-8 gave an average of 144.1 bushels of No. 1's and 69.2 bushels of No. 2 grade.

The 1932 season found eleven other growers enrolled who were convinced, by the previous demonstrations, that perhaps at last the proper analyses had been reached, and with one exception (manure alone) that the ratio of potash was in excess of phosphate, such as a 2-8-16 or 3-9-18. The average yield for 1932 was 318.7 bushels, of which better than 95 per cent were No. 1's.

Where yields of low quality sweet potatoes were the rule a few years back, yields now show better than 300 bushels per acre grading better than 90 per cent No. 1 grade.

**Five hundred pounds of 3-9-18 were used on this field for an average of 438 bushels per acre—98% No. 1 grade.**

# Lespedeza in Kentucky

(*From page* 28)

county, Kentucky, the past year, has made a definite contribution to the information on the fertilizer requirements of Korean lespedeza. The Hughes farm is a red clay loam, and the pH of this particular field was 7, or approximately neutral.

On a uniform area of the field, two-fifth acre plots were staked off. The check plot was given no fertilizer treatment. Another plot received an 0-10-0 fertilizer at the rate of 200 pounds per acre. To a third plot an 0-10-10 fertilizer was applied at the rate of 200 pounds per acre.

It was evident from early spring that there was a difference in the two fertilized plots, but the exact difference did not appear until the hay weights were secured. Then it was learned that the check plot had produced 960 pounds of dry hay; the 200 pounds of 0-10-0 had produced 2,000 pounds of dry hay; and where 10 units of potash had been combined with the 10 units of phosphoric acid, the hay yield had been pushed up to 2,960 pounds per acre, a yield quite comparable to that which many alfalfa growers harvested from their first cutting.

As to seed, 245½ pounds per acre were produced where no fertilizer was applied; where 200 pounds of 0-10-0 were incorporated into the top soil prior to seeding, the seed yield was 511½ pounds per acre. The 10 units of potash in addition to the 10 of phosphoric acid increased the yield to 737½ pounds of seed per acre. The net cash gain for the extra potash was $41.59 per acre.

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# The Inquiring Mind

(*From page* 20)

his mark by his accomplishments and unique talent of original thought and imagination. But he worked too hard. Several times he had to relax, away from school. During one of these exeat periods, spent in Illinois, he acted successfully at the state capital as official reporter for a newspaper, his ability as a writer again serving him well and attracting favorable comment. Re-entering college in 1882, he received his B. S. degree, and in 1886 his M. S. Other honors came to him later in life. Wisconsin University conferred upon him the L. L. D. degree in 1907, and Alfred University did likewise in 1908. In 1919 he was given the degree of Literary Doctor by the University of Vermont, and in 1932 the degree of Doctor of Science by the University of Puerto Rico.

On June 6, 1883, he married Annette Smith. They were blessed with two daughters, Sara May and Ethel Zoe. The latter for many years has been her father's chief and wonderfully efficient assistant in his editorial and publishing labors.

Dr. Asa Gray of Harvard needed a young man to help him in his botanical laboratory and selected Bailey for the position, just after his graduation from Michigan Agricultural College. In that employment he spent two fruitful years, and under Dr. Gray's inspiring and matured leadership, strengthened his hold on the science of botany and decided to make it his

life's work. During those years he met his expenses largely by writing acceptably for the agricultural press and gained reputation by the investigation and proper classification of the genus Carex, of sedges. That was a tremendous and difficult task; but he brought order out of confusion and earned the gratitude of American botanists. He reported the results of his work in the Proceedings of the Sciences, the Botanical Gazette, and in contributions to the U. S. National Herbarium. Later he revised the genus Carex for the sixth edition of Gray's Manual of Botany, and the grape family (Vitaceae) for Gray's Synoptic Flora of the United States. Investigations in the field of botany always intrigued Dr. Bailey. One of his vacations was spent in studies at Kew Gardens, England, and another in the West Indies, investigating the vast genus Bignonia, which was as badly confused as his pet Carex.

In 1885 he was called from Harvard to become Professor of Horticulture and Landscape Gardening in the Michigan Agricultural College. In 1886 he was employed on a geological and natural history survey of Minnesota. In 1888 he was made Professor of General and Experimental Horticulture in Cornell University, which position he filled with marked success until 1903, when he was appointed Dean and Director. In 1913 he retired, but since then he has been about as busy as ever in his varied lines of scientific and literary achievement. So keen is his interest today in new fields of botanical and horticultural work, that his friends would not be surprised to see him, despite his 74 years of age, suddenly flee the rigors of the Ithaca, New York, climate and go exploring in some tropical jungle.

As an educator, Dr. Bailey has, perhaps, been most attractive and impressive in his course on the evolution of cultivated plants. There, his bent for speculation and imagination, as well as for application of his intimate practical knowledge of his subject, found full sway, and his entranced students entered into his love of the subject, profited greatly by his teachings, and look back upon the time spent with him as a period of delight and real attainment. His courses in pomology and the botany of cultivated plants were also attractive and worth while. It has been said that the skill with which he instilled the principles of pomology and botany into the minds of his students was masterful indeed, while "the delights of the walks and talks in the orchards, gardens, and laboratories, and the excursions to other regions, which came as a part of the laboratory work, will never be forgotten by those who had the good fortune to be members of these classes." (Professor G. N. Lauman.)

### *An Able Executive*

As Dean and Director, Dr. Bailey's talents as an administrator were well evidenced by the growth in the standard of scholarship, registration, and material equipment of the New York State College of Agriculture under his management. When he took hold in 1903, the buildings were valued at about $60,000; the faculty consisted of nine persons; twenty-five courses were offered; and the total enrollment of students of all grades was 252. In 1913 when he resigned, the buildings were valued at about $1,125,000; the faculty consisted of 104 persons; 224 courses were offered; and the total enrollment was 2,305 students of all grades. (Professor A. R. Mann.)

To him fell especially the task of deciding how best to strengthen the work already being done at the Experiment Station, what new fields of research to add, and the selection of additional staff members to carry on the increasing work. His wide knowledge of the needs of agriculture and the breadth of his sympathies made him exceedingly efficient in planning the expansion of the work, and his

extensive acquaintance with the workers in this field enabled him to make wise additions to the staff. "In short," says Professor J. H. Comstock, "Dr. Bailey showed a remarkable grasp of the varied interests involved; called strong men to carry on the work; thought out new lines of investigation; and always lent sympathetic aid to his colleagues."

The work of Dr. Bailey as Chairman of President Roosevelt's Country Life Commission in 1908 has been considered perhaps the most far-reaching in its effects, of his many conspicuous services in the field of agricultural education and development. Dr. K. L. Butterfield, President of the Massachusetts Agricultural College, said that Dr. Bailey as chairman not only commanded the confidence of his associates, but of the public. Under his leadership the Commission came into contact with men and women who were a part of the rural problem. He termed the subject investigated "The Building of a New Rural Civilization." He saw the significance both of the scientific and the human, of the practical and the philosophical, of the individual and the social, of the material and the spiritual. The report of the country Life Commission's investigations shows evidence of his graceful and charming diction, making it an enduring classic in its field.

Despite his multitudinous engagements as an educator, executive, and writer, Dr. Bailey has not neglected his duties as a citizen. Indeed, he has been accounted one of the most public spirited, approachable, and neighborly men of the many noble men connected with Cornell University, ever ready to give his time and his money to assist in any enterprise which made for civil improvement, to attend committee meetings, and to take more than his full share of detail work. (J. M. Clapp.)

Then, too, he has been an active or honorary member of some twenty or more American and foreign scientific, philosophic, historical, horticultural, agricultural, grange, and other societies and associations and of four Greek letter fraternities. Honors have been showered upon him, in addition to the university degrees already mentioned. They include: Veitchian silver and gold medals of the Royal Horticultural Society; Wilder medals of the American Pomological Society; gold medal of honor, Garden Club of America; Arthur Hoyt Scott medal and award; Swarthmore College and Horticultural Societies, and Distinguished Service award, American Association of Nurserymen; George Robert White medal; Gold medal, National Institute of Social Sciences; and grand medal Société Nationale D'Acclimatation de France.

> THE present troublous days shall pass, and the steady, sober folk who associate with the living past and participate in the common substantial things that countless generations of men have found to be good —these shall conserve the aspirations of the race and hold it to its destiny.
>
> L. H. B.

Russell Lord in his striking book, Men of Earth, aptly and correctly called Dr. Bailey, "a most unusual combination of teacher, writer, scholar, editor, priest of the natural order, scientist, and poet." That versatile genius is still hard at work completing with his daughter his monumental classification of the plants men grow for a living in America. His philosophy has ripened and broadened as the years have run. He has not become a doubter or a man without vision. He still considers it a public duty so to train the farmer that he shall appre-

ciate his guardianship; for he regards him as a *trustee.* "The productiveness of the earth must," he says, "increase from generation to generation; this also is the farmer's obligation. He must handle all his materials, remembering man and remembering God. *A man cannot be a good farmer unless he is a religious man.*"

Dr. Bailey hopes, sincerely, that the farmer will retain that spirit of individualism which has always distinguished him, and escape being crushed in the interests of organized affairs. He is glad to know that there are still farmers who, when the cattle are housed and the day's work done, walk alone over their land, with the firm feel of it under their feet and their eyes on the dawning stars, and are content.

Always, looking upward from his work-a-day labors, Liberty Hyde Bailey has found inspiration. Ever, he has been journeying on to his purple hills, knowing that "over the hills is a star." Ever, he has counseled his friends to find rest "on the heights where the clouds sweep by, and the world-round gales through the heavens fly."

And so, now he looks confidently toward the eternal rest into which he will enter when his task on earth is done, and he finds peace in the faith he has beautifully expressed in these closing lines:

If there be things I cannot tell,
The more I trust that all is well.
I take the cheer from daily lot,
And for the rest, I vex me not,
For what there is beyond the sod,
I leave it all to Time and God.

. . . . . .

And when the last day complete shall ope,
I will gather my dreams to me,
And setting my ship to the Isle of Hope
Sail out to the somnolent sea.

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# The Artichoke Turns Samaritan

(*From page 26*)

3½ feet apart with the plants 1½ to 2 feet apart in the row will usually be found satisfactory. This spacing permits the use of a corn cultivator for the first one or two cultivations. After July 1 the tops will shade and kill out all weeds.

The most costly operation in the cultivation of the artichoke is harvesting. In order to secure maximum yields, the investigators at Iowa State College found, the grower should not commence harvesting until the leaves have been killed by frost. A corn knife may be used for cutting off the tops, and if the rows are long enough, a corn binder may be used for binding up the stalks.

Since the Jerusalem artichoke sets many tubers at long distances from the base of the stem, it is unwise to use a potato digger. This is especially true on heavy soils. The roots entwine with the tubers in a large mass, making digging a more difficult task than it is with potatoes.

The tops of the Jerusalem artichoke would doubtless make good ensilage, investigators believe, but if they are cut off in September when they are still green, the yield of tubers will be lessened considerably. The plants do not set tubers until August, regardless of planting date. By the time the tubers have fully developed, the tops are hard, woody, and unfit for ensilage.

Jerusalem artichoke tubers lose moisture rapidly when stored at room temperature and are subject to disease.

Most authorities agree that the best method of storing is to leave the tubers in the ground and dig them when needed. If the tubers are to be used for seed in the spring, they should be left in the ground all winter, unless they can be stored at temperatures near the freezing point, according to vegetable crops experts at Iowa State College.

# Tobacco "Magic"

(*From page* 22)

of the land providing the land and equipment and the share grower the labor, each receiving half the proceeds. Each grower handles on the average about 30 acres of tobacco crop. In many cases the land is owned by individuals or companies operating a number of farms, several companies having from 20 to 50 individual farms. This condition presents an interesting development of corporation farming.

The tobacco plants are grown in greenhouses or glass-covered plant beds and transplanted in the fields about May 15 to June 15. Most of the crop is harvested between about Aust 5 and September 15. Up to 1931 most of the tobacco was cut, but in 1932 over 90 per cent of the crop was "primed," that is, the leaves were pulled from the plants as they matured. This method produces a higher average quality of cigarette tobacco than does stalk cutting.

Plenty of problems face the grower —the selection of land, the growing of vigorous plants, disease, cultural methods, handling and curing—but probably the questions most discussed have to do with fertilizer. From 600 to 1,000 lbs. of fertilizer are used per acre, and more than 10,000 tons are purchased annually by the Norfolk growers. It costs a lot of money, and results are so important that naturally they are all interested.

The Dominion Tobacco Station at Harrow has experimented with tobacco fertilizer for years, and the Ontario Agricultural College has carried on field experimental work during recent years.

The popular analyses have been 3-8-4 or 3-8-5 at about 1,000 lbs. per acre, but experimental work shows that 1,000 lbs. of 3-9-6 or 600 lbs. of 4-12-8 on the average would be more satisfactory. There are some in-

Cultivating tobacco on the sand which ten years ago gave Norfolk county a poor reputation.

dications to show that even a higher percentage of potash could, with advantage, be used. Consideration must be given the origin of nitrogen in the mix and the amount of chlorine. Then the land and the rotations vary, so that there is still a field for much study. In the meantime the extension workers are being asked a thousand questions each year.

In marketing the tobacco crop in Ontario, the manufacturer or leaf dealer usually buys the whole crop from the grower at a definite price depending on average quality. There are no auction sales, and no attempt at cooperative selling at present. At the time of writing the market has not "opened." In the meantime much calculating is being done by buyers, growers, bankers, merchants, and to some extent by almost every one in the district. Those closest to the business are viewing the world's tobacco situation, for now Canada's market is on an export basis. They are considering the rates of international exchange, excise and custom duties, the British preference, handling costs, and a multitude of details which will affect values, particularly in this time of unusual conditions.

The growing of tobacco has its hazards and is speculative. The marketing of the crop presents its difficulties. Some men have gained; others have lost. The Norfolk District has, however, undergone a great and spectacular transformation, and prospects for the future seem bright.

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# Potash Is Necessary for Grapes

(*From page* 44)

the value of the appearance of the plant in diagnosing a great lack of potash and in determining when this lack has been corrected.

### *Practical Conclusions*

1—When a high-yielding vine is established on a calcareous clay soil and has sufficient moisture for its full development, the heavy yield it should produce causes its roots to draw large quantities of potash from the soil.

2—However rich in potash the soil may be originally, it is quickly depleted, so that the vine can no longer obtain from it sufficient potash. It then draws on the potash reserve in the clay and this capital, which should be maintained, is also depleted. The nutrition of the vine is then so deficient in potash as to cause browning, yellowing, stunting, and nonmaturity.

3—In order to remedy this pathological situation, it is necessary to apply very large applications of potash to the soil. These are used at first to replace the capital of potash in the clay, without materially benefiting the plant. After the absorptive capacity or "hunger" of the soil has been satisfied, the added potash then begins to satisfy the plant's hunger. The experiment showed that this result is attained in three years only by three annual applications of 1,068 pounds per acre of muriate of potash on this soil.

4—This large application of potash is really a medication of the abnormally depleted soil. It is the penalty of neglect in the fertilization of high-yielding vines. This should be avoided by fertilizing the vine regularly with a fertilizer so as to apply 180 pounds of actual potash or 360 pounds of muriate of potash per acre.

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Lagatu, H. and Maume, L. Un Cas d'Absolue Necessite d'Engrais Potassiques. *La Potasse, No.* 53, *page* 101. *August-September,* 1932.

# The Keep of Sweets

(*From page 7*)

yield was an even 500 bushels per acre, or about 200 bushels more than the average for that particular season.

The illustration of three hampers shows the condition of these potatoes just one year from the time they were harvested and placed in storage. And this splendid condition existed after a very hot summer when it was, of course, impossible to keep temperatures in the storage house anywhere near 50 or 55 degrees F.

Similar sample hampers were displayed at the Keller, Virginia, Agricultural Fair and at Richmond, Virginia, to show that high potash does not injure the keeping quality of sweet potatoes and that Big Stems will keep well if given proper fertilizer and attention.

It will be noticed that Mr. Elzey applied 240 pounds of actual potash per acre or the equivalent of about 500 pounds of muriate of potash. This is the practice of growers in the Vineland, New Jersey, section, that is, to apply 500 pounds of muriate of potash previous to setting out the crop.

In Bulletin No. 66, Virginia Truck Experiment Station, is the following: "The sweet potatoes treated with the 12 per cent and 15 per cent potash were in excellent condition at the end of the storage periods and suffered only 1.1 per cent and 3.0 per cent losses by rot . . . . There was apparently no correlation between the percentage composition of the fertilizer used and the losses by rot and shrinkage of the crop in storage."

### *Potash, the Best Bet*

In the light of experimental results of experiment stations in the important sweet-potato areas, and the results on farms of practical growers reported in this article, high-potash fertilizers appear to be the growers' best bet. Not only are yields maintained at a higher average level, but invariably the potatoes are of more uniform size and shape, and have better color and skin texture. These results do not in any degree support the contention of some farmers that high potash makes for poor keeping quality.

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# Back to the Farm

(*From page 12*)

the locality had seemed "a wholesome country to live in."

At first farm affairs had not moved ahead altogether satisfactorily. Some years the returns from trucking had been good; but there had been more lean years than good ones, even "times when you couldn't get enough for vegetables to pay the fertilizer bill." Nevertheless, there had been "plenty to eat," according to the sailor who had turned farmer. "Taking it all in all, I have got along nicely," he mildly boasted. "Lately things have been coming my way. You might be surprised to know that I have made good money on my timber. Last year over four hundred dollars' worth was sold to the paper mill at Moss Point, and they came and cut it. And still there are a few more acres to cut. Pine trees grow fast in this sandy ground. I fig-

ure I can go through my woods every few years and take out a considerable number of cords. That brings immediate cash, down at the landing on Dog River, which isn't far. Besides that, my pecans are beginning to bear pretty good. I'm getting all fixed now, and am enjoying life too. I like fishing and hunting and roaming through the woods. There is plenty of time for matters of that kind after the vegetables are harvested."

### *Content in Ownership*

The other experience was on one of the great sugar centrals in eastern Cuba. Lean prices for sugar had enforced the lowering of wages almost to the vanishing point. There had been suffering among the workers, and the promise was for even greater distress. Acting upon this threat, the plantation manager had notified the field laborers, chiefly blacks from Haiti, living under crowded conditions in huge palm-thatched sheds, that those who cared to do so would be permitted to take over for their own use a reasonable acreage of ground. This was during the planting season of 1931. Eighteen hundred acres of land were planted almost immediately in odd patches scattered about the estate. Small, comfortable shacks were then erected by the side of the diminutive farmsteads.

In January, this year, the manager of the central was dismayed by an order from headquarters in New York to the effect that the cutting of cane was to be delayed 15 days beyond the opening of the grinding campaign. "This means," said the manager, "that we are going to lose our labor. All the neighboring centrals start grinding tomorrow. Now, every black on the place will move to those plantations where they can find work. We shall be put to great expense, trouble, and delay recruiting labor far and wide. Our workers will disappear over night, every single one of them. It's their way of doing things."

Then the miracle! Not a man left; not a word of dissatisfaction was uttered. The laborers remained contentedly by their patches of bananas, potatoes, corn, and beans.

"This never happened before in the history of eastern Cuba," remarked the astonished manager. "It's all perfectly clear now, however. What these fellows have wanted all the time was a patch of ground they could look upon as their own. Why we haven't thought of giving it to them before this is beyond me. It's the only sensible thing to do anyway. These people can not possibly live on the small wages the mills can afford to pay in times like the present, with only two or three months of work a year; but they can live and live quite comfortably with all their food grown on their little places. You know, this land will produce pretty nearly anything these fellows want, with just a little work."

It is unnecessary to go to foreign lands for examples of soil-derived contentment. Revival of this age-old asset of farm life is taking place today in many parts of America. It is not in the South alone that housewives are canning largely increased quantities of fruits and vegetables, and that men are taking better care of farm tools and cleaning out long neglected weed patches.

### *A Friend to Man*

The soil remains a friend of comprehending mankind, whether it lies within the sandy bottoms of Dixie, the plains of Kansas, or upon the slopes of far distant places. How many of those taking part in the present back to the land movement will make that intimate acquaintance with the "good earth" which coaxes fruitful response and human contentment remains to be seen. Certain it is, a vast tide of hopefulness and no little of stern determination will accompany this shift in the direction of the land. Certain it is, also, that every capable agency

should lend a helping hand in the matter of directing the participants in this movement toward good land where there will be a chance for success, remembering that a man may spend a lifetime on poor land, especially that suffering from continuing erosion, without bettering himself or the land.

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# Oh! Owe!

(*From page* 4)

But an insurance actuary told me lately that the solution of the vast debt problem was in some long-time funding operation, which is like writing your debts down in a diary and laying it away as a memorandum rather than a moratorium. The real thing we need to know, however, is that we must fix it up somehow so that progress will not be gummed up by the mud we gathered on the wheels and brakes back in the joy-ride era. If we let the shadow of our private debts gibber at us like goblins, how in thunder are we going to cease shivering and brooding so that normal relations may be resumed?

Three years or more ago we regarded debt as a mark of ambition and capital investment spread between several holders. Today we have allowed a vastly different psychology to grip us concerning debts, which changes ambition into inhibition and progress into paralysis. Isn't it a silly picture—Americans with just as much potential power and skill now as in 1928 dodging each other and getting soaked with gloom by the water that has run over the mill-wheel?

When I was a kid in the grades, arithmetic scared me. That's just what ails the finances of the country today, relating to our debts especially. We have let arithmetic get our nannies. We put all those sums down and multiply them by delinquencies and defaults and then sigh and exclaim that we just know we cannot pass the examination nohow. When we went to school, nobody bothered about billions—millions seemed too big. The world hadn't grown that large and ambitious with its adding machines and comptometers. We used to snicker at the Chinaman with his queer counting apparatus on sticks, but he and his race have lived within the scope of that kind of reckoning and still get their rice and pay their debts on New Years. We did like the rabbits, learned to multiply and dodge the dogs. Is that progress or what do you wish to name it?

And then on top of that we dicker with a dollar that expands and shrinks in buying power like a teeter-totter which has price levels on the other end. We never ask for any gold unless we go after it like a fish with mouth open in the dental chair—and still we worship some fixed valuation in a gold dollar sign. Our arithmetic fetish and touch-me-not gold obsession have combined to give us jitters.

All this chatter and raving about extensions on mortgages mean only half measures until we go hot after the bogey of arithmetic and the rubber dollar. Life insurance companies and farmers themselves as well as the

federal land banks holding farm securities represent the major part of the land credit today. Extensions on any great amount of farm debt will surely affect them one way or another, directly or indirectly. It all works right back to the humble citizen.

YOU can take that same table of debits above mentioned and change them into credits and you'll have the same classes and groups involved as you had on the other side. And about all the bloated plutocrats do is stand in the middle of the picture and weep. I fail to locate one pussy-banker or malevolent magnate who is looking forward to being happy when the rest of the world is scared about its arithmetic lesson.

But the fact remains that the big financial fellows are often the greatest dunces when faced with the problem of the price-and-dollar-value teeter-totter. Most of the farmers, presumed to be green, are wise to what's the matter and we shall see what happens to our gilded goat before the year is up! Maybe we'll put him in a crate and shrink him down to a size where he can't butt us all out of balance.

An editorial friend of mine, who retains traces of an ancient ideology along with his package of fine-cut, once heard an economist friend of ours amplify the facts somewhat as just outlined, albeit more academic. He uncrossed his legs and snaked the spittoon closer to his chair, remarking sagely: "But you overlook the cussedness of human nature, which in the raw is seldom mild! I lay the blame for our situation and our debts simply to our own reckless abandon."

He forgot hundreds of simple folks I know whose years of hard thrift and short shift would make Mahatma Gandhi look like Jimmy Walker. He represents the kind of men who prefer to let the world of wise men and patient fools continue to play the skin game with a deck of doctored cards. What we need is a new pack and no favorites for this thrilling contract game.

And so until we get a new deal on the dollar and learn our arithmetic better, some of us will see some irony in the items legally left to us after the eviction proceedings. In my State those who suffer the process of chancery execution have such items left sacred to them as "one musket, rifle, or shotgun, and a seat or pew in any house of public worship." They also have "six hives of bees" left untouchable, presumably fearing lest they have not been sufficiently stung already. I fear that some of the ultra-conservative deacons of the church who hold gilt-edge paper on foreclosed farms may be alarmed to see gaunt creditors file into the aisles with muskets on their shoulders and swarms of bees in their pockets.

"FOR value received I promise to pay" sums up the basis upon which time and custom has established the principle of debt. But when that aforesaid "value" shrinks out of all proportion to the current worth of it when the note was written, it is little wonder that we hear some radical "sidewalk economists" propose unheard-of adjustments.

Debt principal and interest terms may have to be shaved down everywhere, but it seems more likely that this will come through agreements than by legislation—by compromise rather than compulsion.

The trouble with legislation calling for extended postponement of debts and taxes in any one State or locality is obvious. North Dakota voters turned down a three-year moratorium which applied to all private debts and all taxes, exempting, however, corporations and persons who must pay because they were able to pay. Here there was no other sensible course than to reject the proposal in the interest of the State's pub-

lic credit on bonds and the individual's financial safety. Had it passed and become a law, poor North Dakota would have been invaded by creditors and stripped of every material possession for security. Sweeping as the fever was for a new deal in national politics, the Dakotans did not so far forget the old traditions as to accept this hysterical referendum.

Debt is as old as human races. Probably many of the debts contracted in the days of Caesar and Hannibal have never really been completely paid. There are two parables in the New Testament which bring out some mighty interesting phases of the debt question.

In these days when we hear of cancellation of international debts, consider the story which Christ told to Simon Peter. "There was a certain creditor which had two debtors. The one owed 500 pence and the other 50. And when they had nothing to pay he frankly forgave them both. Tell me, therefore, which of them will love him most?" Ponder on that for awhile in connection with our rating as Uncle Shylock in the world's market place.

AND again consider the other parable: "Then the lord of that servant was moved with compassion and loosed him and forgave him the debt. But the same servant went out and found one of his fellow servants which owed him 100 pence; and he laid hands on him and took him by the throat saying, 'Pay me that thou owest.'" You might slip that into the same filing section with the other one.

I fear this second one knocks some of the varnish off the argument that debts will be settled by mutual agreement instead of by universal law. Maybe what we shall need is a big stick placed in the corner in a secondary position to stroke the fur of the fellows who won't abide by public opinion in settling debts.

If debts are mostly payable in commodities at current values, then it is just as hard for the creditor to stand pat and get his original principal back again as it is for the debtor to dig it up. If the argument is advanced that lower wages buy as much goods as ever at the lower price levels, is it not just as true that lower debt principals afford similarly equal purchase power?

IN going through current literature on farm debt, one cannot help noting that everyone puts the average farmer on the red ink side of the ledger as facing heavy mortgage payments. As a matter of fact that is not true. All farms are not mortgaged, and active and retired farmers hold the second largest percentage of mortgage paper on farm property in the country.

Of course, they are often on the long end of a big lump of liability as things seem now. They may even be worse off than the operator of the farm on which they hold paper. But if this be true of farmers as money lenders, it is equally true of the insurance companies—except that the latter have many nests with more eggs in them. This situation means that a large body of farm creditors, experienced, sympathetic, and desperate, are joining hands with the farm debtors to force across some sort of adjustment. If the farmers have enough control of the Federal Land Banks and the country banks to get them into line, then a major part of the existing debt structure against our farms will actually be more easily adjusted than industrial and commercial debts.

Just one more item. We hear lots of folks crying for high prices again, but what would be their attitude toward existing debts if those peak prices came back? Human nature is a queer article. Right now when values are down everyone wants to pay off and not invest; and when prices soar everyone wants to invest

**CONFIDENCE WINS**

THE relations between a farmer and his Federal Land Bank are based on mutual confidence. The Bank has shown confidence both in the farm and the farmer by making him a long-term loan on liberal terms. The farmer has well-founded confidence that the Bank will show a sympathetic understanding of his problems.

The farmer knows that he receives individual consideration of his problem. This individual consideration instills the confidence both for the maintenance of his home and his farm.

**FEDERAL LAND BANKS**
**are located at**

| | |
|---|---|
| Springfield, Mass. | New Orleans, La. |
| Baltimore, Md. | Omaha, Neb. |
| Columbia, S. C. | Wichita, Kan. |
| Louisville, Ky. | Houston, Tex. |
| St. Paul, Minn. | Spokane, Wash. |
| St. Louis, Mo. | Berkeley, Cal. |

and spend recklessly. Maybe we ought to adopt the Chinese New Years ideal. Paying up regularly and fully won't be much harder to solve than finding ways to postpone it.

This debt hysteria can go much too far in small ways. In fact, that's where the chief irritation lies—in the household transactions. For instance, my corner grocer was hard pressed by wholesalers and he decided to be smart and modern. He installed a new system of dealing. No book credits because of some big outstanding bills. No siree, everyone had to plunk down cash and carry, or buy coupon books at $10 each. Well, most of the salaried men who paid their bills monthly quit his store and all he had left were the selfsame dead-beats who couldn't shift and the kids who patronized the penny candy counters. So it is still true that an honest book account is as good as money in the bank for the creditor. And by and large the majority of us are honest. If we can patch up our judgment a little to match our honesty, the future of America is assured.

OF course it's natural for many of us to be a little behind when we get something ahead. When I'm walking on slippery sidewalks in zero weather, I cogitate about the last payment on the ice bill; and when I start mixing mint juleps in July, the last payment is made on the coal. I suppose a certain degree of every-day credit will survive this wave of settlement. If it doesn't, no matter what happens to national debts, yours truly will be sunk.

Yet I confess not to have solved this weighty matter. Loan an honest man a dollar in normal times and you have made an investment. Loan the same guy a nickel in a panic and your name is Hoover. If you have a clue to the jig-saw puzzle send same either to me or to Franklin Roosevelt. It'll be all the same anyhow.

### WASN'T A TOTAL LOSS

Some of the depression sufferers are like the darky who had been rolling the "bones."

He said: "Tell you, boys, I dun los' a heap o' money las' night."

"How much, Mose?"

"A hunnerd and six-seben dolla's and fo'teen cents."

"Golly! Dat wuz a heap o' money."

"Yas, sir-ee, and de wust of it wuz de fo'teen cents wuz cash."

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Sorority Frosh: He is all the world to me. What would you advise me to do?

Been There: See a little more of the world, my dear.

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Miss Neverstop, seating herself between two much-engrossed elderly men, exclaimed: "A rose between two thorns."

"No," retorted one, "say rather a tongue sandwich."

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### NOT SO BLIND?

The young fellow in the sleigh stopped to pick up a group of school children. It was so crowded one girl had to sit on his lap.

"Do you like school?" he asked.

"Yes, sir," she replied.

"Do you go to school every day?"

"I never miss a day."

"Good, little girl! Here's a reward for that," he remarked, kissing her cheek, "and do you like your teacher?"

"I am the teacher," she replied.

### WHO WOULDN'T?

Two lady school teachers from Brooklyn, spending their sabbatical year exploring western Canada, stopped at a small and old-fashioned hotel in Alberta recently. One of the pair was inclined to be worrisome when traveling, and she couldn't rest until she had made a tour of the corridors to hunt out exits in case of fire.

The first door she opened, unfortunately, turned out to be that of the public bath, occupied at the moment by an elderly gentleman taking a shower.

"Oh, excuse me!" the lady stammered, flustered. "I'm looking for the fire escape." Then she ran for it.

To her dismay, she hadn't got far along the corridor when she heard a shout behind her and, looking around, saw the gentleman, wearing only a towel, running after her. "Where's the fire?" he hollered.

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Percy: "What's the best color for a May bride?"

Henry: "Just according to your taste. I prefer a white one, myself."

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A hick town is one where there is no place to go that you shouldn't.

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### NO COMPLIMENT

Lone Golfer: "Sonny, you've been following me around for an hour. You'll never learn to play golf watching me."

Sonny—"I ain't watching you, mister. As soon as you dig up ten more worms I'm going fishing."

| GAIN IN DOLLARS PER ACRE FROM ADDING 5% POTASH TO THE FARMERS' REGULAR FERTILIZER AT A COST OF $3 PER ACRE | | | |
|---|---|---|---|
| Year | North Carolina—Virginia | South Carolinia | Georgia—Florida |
| 1928 | $45.27 | no tests | $25.12 |
| 1929 | 36.99 | $20.62 | 30.75 |
| 1930 | 39.60 | 24.85 | 18.75 |
| 1931 | 28.46 | 32.84 | 21.91 |

# Quality Pays!

POTASH is the quality-producing element in tobacco fertilizer. Quality is of great importance with millions of pounds of "common tobacco" being produced each year. Potash also greatly increases yields. Chemical analysis shows that a crop of tobacco removes from the soil more potash than both nitrogen and phosphoric acid combined.

Field tests throughout the Bright Tobacco territory have shown that farmers can profitably apply two to three times as much fertilizer as the average crop receives. The table above shows the results obtained by adding 5% potash to the average fertilizer in tests by 138 farmers on 1,242 acres. Fertilizer containing 3% potash was compared with fertilizer containing 8% potash or fertilizer containing 5% potash was compared with fertilizer containing 10% potash, etc.

It pays to select a fertilizer containing 8 to 10% potash. If this cannot be obtained, the potash content of the fertilizer can be increased by applying 200 pounds of sulphate of potash with each ton of fertilizer used. Extra potash can also be used as a top-dresser—100 pounds of sulphate of potash at the first plowing.

**N. V. POTASH EXPORT MY., Inc., Hurt Building, Atlanta, Georgia**

We will be glad to send you free on request several copies of our illustrated leaflet "TOBACCO that gets the Top Dollar" to give to your farmer friends.

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